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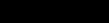
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" A R E P L Y

TO

MR. COOKE'S PAMPHLET,

"THE ELECTRIC TELEGRAPH ;

WAS IT INVENTED

BY PROFESSOR WHEATSTONE?"

L O N D O N :

**RICHARD TAYLOR AND WILLIAM FRANCIS,
RED LION COURT, FLEET STREET.**

1855.

[*Price One Shilling.*]

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“THE ELECTRIC TELEGRAPH;

WAS IT INVENTED

BY PROFESSOR WHEATSTONE?”

IN undertaking to reply to the pamphlet bearing the above title, Mr. Wheatstone must disclaim any undue impression that its discussion is entitled to engage public attention. Though he is aware of the interest taken in the Electric Telegraph, he is not solicitous to divert it to his personal exaltation, if he now seeks to perform the duty which every man owes to himself of vindicating his name from unmerited detraction. He is bound to record his claims, as inventor of this instrument in the form which first made it practically available; for these have been publicly questioned by his former partner Mr. Cooke. At the same time, had he been left to follow his own inclinations, he would certainly not have troubled the world with their differences. He has not cared hitherto to publish a line on these topics, for his position was sufficiently understood and fairly recognized beyond the circle of Mr. Cooke's acquaintance. But as Mr. Cooke has at length ventured to appeal to a wider tribunal, Mr. Wheatstone is called upon to use the materials he possesses to confute Mr. Cooke's many

misrepresentations, and to uphold, as is due to himself, the just verdict of their contemporaries.

Mr. Cooke's disparagement of Mr. Wheatstone's position (see pp. 4 & 5 of his pamphlet) extends to no less than this:—that Mr. Wheatstone became one of the patentees of the first practical electric telegraph, “not from his philosophical information, nor from his experimental ingenuity, but from a communication made to him in confidence by Mr. Cooke, who was then completing the practical invention, and was about to take out a patent for it; who was in possession of practical electric telegraphs, already made by him and *fit* for practical use; who had worked out into a pamphlet* or *sketch* a detailed practical system of electric telegraphing; who was in negotiation with a railway company for the practical application of the invention upon their line; and who, having consulted Mr. Wheatstone as a scientific man, was induced by his scientific acquirements, and by pecuniary considerations, to admit him to a share in the patent as second partner.” This, which is Mr. Cooke's language, with some abbreviations, amounts in substance to a denial of any originaive share on the part of Mr. Wheatstone in the first telegraphic patent, and is consistent with the further allegation on page 9 of the pamphlet, that Mr. Cooke was himself “the originator of the practical electric telegraph.” It would be easy to show that this is inconsistent even with former printed admissions of Mr. Cooke†, but it is so far more grossly inconsistent

* No further reference will be made to this pamphlet, as it was never published, nor even in its manuscript form exhibited to Mr. Wheatstone.

† It is inconsistent with his *written* admissions, so late as January 7th, 1845; for in a letter to Mr. Wheatstone of that date, he ob-

with the facts about to be detailed, that this discrepancy is comparatively trivial. Mr. Wheatstone will not only show that the representations of Mr. Cooke are at variance with these facts, but that the facts sustain the position which he has invariably claimed for himself, and which cannot be better stated than in the words of the 'Quarterly Review,' to which Mr. Cooke objects, that Mr. Wheatstone was "the first contriver of the electric telegraph in the form which made it available for popular use."

The proofs of this assertion will be given in a few particulars, divested as far as possible of immaterial statements. Before Mr. Wheatstone had the slightest knowledge of Mr. Cooke, the subject of telegraphic communication had occupied his thoughts for many years. He had paid great attention to the attainment of this object, by means of electricity, and had made important practical advances, which were already mentioned in print, before Mr. Cooke's introductory visit to him. In the third volume of the 'Magazine of Popular Science' it was stated that:—

"During the month of June last year (1836), in a course of lectures delivered at King's College, London, Professor Wheatstone repeated his experiments on the velocity of electricity, which were published in the 'Philosophical Transactions' for 1834, but with an insulated circuit of copper wire, the length of which was now increased

serves:—"You reap your most popular reputation from this invention:" (referring to the electric telegraph)—"*for the part you have performed in it, you deserve it!* but it is my belief that I deserve as much for what I have done, *not as a scientific*, but as a practical man." In a letter of the 20th of October, 1840, he had urged Mr. Wheatstone to put him in a right position with regard to their joint invention—"not indeed as the original projector and leading inventor, for that I did not ask or desire."

to nearly four miles ; the thickness of the wire was the $\frac{1}{16}$ th of an inch. When machine electricity was employed, an electrometer placed on any point of the circuit diverged, and whenever the continuity of the circuit was broken, very bright sparks were visible. With a voltaic battery, or with a magneto-electric machine, water was decomposed, the needle of a galvanometer deflected, &c. in the middle of the circuit. But, which has a more direct reference to the subject of our esteemed correspondent's communication from Munich, Prof. Wheatstone gave a sketch of the means by which he proposes to convert his apparatus into an electrical telegraph, which, by the aid of a few finger-stops, will instantaneously and distinctly convey communications between the most distant points. These experiments are, we understand, still in progress, and the apparatus, *as it is at present constructed*, is capable of conveying thirty simple signals, which, combined in various manners, will be fully sufficient for the purposes of telegraphic communication."

It was not till Mr. Wheatstone had reached this stage in his progress to a practical result, which he subsequently attained on the plan thus announced, that Mr. Cooke introduced himself to Mr. Wheatstone, on the occasion mentioned in page 20 of his pamphlet ; and he then came, as he states, "to consult Professor Wheatstone," by the advice of Dr. Roget, who immediately referred him to Mr. Wheatstone, as to one who was known to be engaged in experiments of this description, and who possessed the means of answering Mr. Cooke's inquiries.

On that occasion Mr. Wheatstone mentioned, and at another interview he exhibited to Mr. Cooke some of the results he had attained, and communicated to him others which he contemplated ; *subsequently* to which Mr. Cooke exhibited to Mr. Wheatstone the instrument he had himself proposed. Mr. Wheatstone saw that Mr. Cooke's was an inefficient contrivance, which neither in mechanical construction or application of scientific principles fulfilled the conditions required

in a practical electric telegraph. This instrument, notwithstanding Mr. Cooke's statement, had never been practically applied, and was incapable of being so ; while, on the contrary, the instruments Mr. Wheatstone had proposed were all founded on principles which he had previously proved, by decisive experiments, would produce the required effects at great distances. On no occasion during Mr. Wheatstone's acquaintance with Mr. Cooke and his "practical realities" was Mr. Cooke's instrument exhibited to him in action, even in a short circuit ; it was, after it had been proposed to be inserted in their first patent, omitted as useless, and Mr. Cooke, when he took out the second patent himself, did not think it of sufficient importance to mention it there. Mr. Cooke's "practical realities" were thus tacitly admitted by himself to be abortive, while Mr. Wheatstone's "philosophic toys" were not merely theoretical, but, as the event proved, eminently of a practical nature.

Mr. Cooke's intention was, as he told Mr. Wheatstone at an early stage of their acquaintance, to take out a patent for his invention ; Mr. Wheatstone's, when he had finished his experiments, was to publish the results, and then to allow other persons to carry them out in practice. When Mr. Cooke discovered that his instrument was inapplicable to the purpose contemplated, and that Mr. Wheatstone's researches were more likely than his own to be practically useful, he proposed a partnership, and that they should take out a joint patent. Mr. Cooke is of course at liberty to state as he pleases his own inducements for *making* this proposal ; but at all events Mr. Wheatstone's sole reason for *accepting* it, was the evident possession on the part of Mr. Cooke of the zeal, ability and perseverance required for a commercial enterprise,

and the expression of his intention to devote to it his entire time and energies. Mr. Wheatstone felt confident of overcoming himself all the scientific and mechanical difficulties of the subject, but neither his occupations nor his inclination qualified him for the part which Mr. Cooke undertook to perform. The motives which induced Mr. Wheatstone to associate himself with Mr. Cooke are more amply stated in his letter (Appendix A.), and any objections he entertained having been removed by Mr. Cooke's representations, the partnership was formed in May 1837, under which they took out, in the June following, as their joint property, the first telegraphic patent*.

The Magnetic Needle Telegraph, which was the principal subject of this Patent, is the instrument on which Mr. Wheatstone relies for a refutation of Mr. Cooke's claim to have participated in his invention; *à fortiori*, to exclude Mr. Cooke's pretensions, as stated in his own phrase, of having been its '*originator*.' It was indeed at first agreed between them that their two several instruments should be jointly included in this patent; but during the drawing of the specification, and after the description had been prepared, Mr. Cooke, as has been stated, having become convinced of the inefficiency of his instrument, withdrew its description and the accompanying drawings from the specification, leaving Mr. Wheatstone's to stand alone. In this instrument Mr. Cooke had not the slightest part. This Telegraph† was entirely and exclusively

* The specification of this patent is published in the 'Repertory of Patent Inventions,' Nos. 61 and 62, N.S.

† The electro-magnetic alarm, brought into action by means of a short secondary circuit, which forms a separate part of the first patent, was also an invention of Mr. Wheatstone's; but as Mr. Cooke stated that he himself had proposed to ring a bell by means of

Mr. Wheatstone's invention, in no respect derived or borrowed from any ideas of Mr. Cooke, or from anything he had done ; but designed in pursuance of Mr. Wheatstone's plan which had previously been announced in public. The original suggestion of Ampère, and the idea of placing instruments to act consentaneously and simultaneously at opposite extremities of the line, or the principle of reciprocal communication, which was common to several previous schemes that came to no immediate issue, such as Ronalds', Gauss and Weber's, and Schilling von Canstadt's, were the only principles of the instrument which Mr. Wheatstone derived from anybody. The important principle of his permutating key-board, by which a few wires could be converted into a great number of circuits ; the indication of the characters by the convergence of the needles ; the employment of vertical astatic needles ; the limitation of the motion of the needles to a few degrees by fixed stops placed at the centre of percussion, so that they should point steadily and rapidly to the characters ; and the dispensing with mercurial contacts wherever the circuit was required to

an electro-magnet, and also claimed an *independent originality* in the idea of effecting this action by means of a secondary or relay circuit, Mr. Wheatstone has always represented this as a joint invention. It is however the only one which can be considered as having been made in common during the entire period of their association.

Electro-magnetic alarms, in which the detent of machinery was released by the motion of magnetic needles and bars acted on by electric currents, had been previously employed by Gauss and Weber, and by Schilling von Canstadt, in their electric telegraphs. Apparatus had also been set in motion by the attraction of electro-magnets, though not for telegraphic purposes, as no person had succeeded in producing any such effect at considerable distances.

be broken or completed, were all points which Mr. Wheatstone had never heard of before, and which he does not believe that any person can contest with him. The result was an original instrument, which, independent of other advantages, presented a far more rapid sequence of signs than had been contemplated in any previous attempt towards an electric telegraph ; or, indeed, in any telegraph whatever. A most important point was his application of the theory of Ohm to telegraphic circuits, which enabled him to ascertain the best proportions between the length, thickness, &c., of the multiplying coils, and the other resistances in the circuit, and to determine the number and size of the elements of the battery required to produce the maximum effect. With this law, and its applications, no persons in England who had before occupied themselves with experiments relating to electric telegraphs had been acquainted. To this extent therefore this Magnetic Needle Telegraph was an invention exclusively and entirely Mr. Wheatstone's, and rendered by him complete in all its details ; and if, as Mr. Wheatstone has ever freely admitted, he applied in the instances specified principles discovered or developed by a succession of eminent men of science, he is proud to acknowledge his obligations to his true fellow-labourers, but he is at the same time unwilling to resign any portion of what is due to himself, to the confident assumptions of his former partner Mr. Cooke.

This Magnetic Needle Telegraph is an answer in full to the question Mr. Cooke has raised. It was this—the instrument of Mr. Wheatstone alone, which was employed in the experiments made on the London and Birmingham Railway, for which Mr. Cooke laid down

the wires; and it was this instrument, the practical efficiency of which was conclusively demonstrated, as appears by the testimony of the following letters* :—

“ London and Birmingham Railway, Engineering Department,
Camden Station, September 18th, 1837.

MY DEAR SIR,—I have great pleasure in adding my testimony to that of many others, who have been gratified by witnessing the very beautiful experiments exhibited by yourself and Professor Wheatstone to prove the practicability of transmitting signals by means of electro-magnetic fluid. Nothing can have been more satisfactory than these experiments, which have placed beyond a doubt that the principle may be applied with unerring certainty.

“ I am, dear Sir, yours very truly,

“ CHARLES FOX, *Resident Engineer.*”

“ W. F. Cooke, *Esq.*”

“ King’s College, January 16th, 1838.

“ MY DEAR WHEATSTONE,—I cannot refrain from expressing to you the pleasure I felt at witnessing the complete success of your Electro-Magnetic Telegraph. I am quite surprised at, and almost at a loss to account for, the different effect produced upon my mind by *believing* and *seeing*. I had followed, as you well know, all your

* This instrument, though not now in operation on telegraphic lines, has not been discontinued on account of its inefficiency; for it is simple in its construction, certain in its action, and rapid in its indication of the letters of the alphabet, which may be read without any difficulty. The sole reason that it is not at present in extensive use is the expense of the conducting wires, which renders it more advisable in a commercial point of view to employ instruments in which one, or two wires at most, are employed, but whose advantages in other respects are not so great. If a telegraph be required for short distances, and for common use, there is none even now that can compete with this. Had the magnetic-needle telegraph been originally brought forward in the form at present adopted, it would have been long before its efficiency as a practical instrument would have been recognized by those influential parties on whose convictions the introduction of the telegraphic system mainly or entirely depended. Prof. Daniell himself would not have regarded such an instrument with the enthusiasm expressed in the letter above quoted.

experiments from the beginning, and was intimately acquainted with both the principle and construction of your apparatus ; but nevertheless, when I saw it in action upon the Birmingham Railroad, I was struck as with something quite new, the facility with which I could myself immediately read signals communicated from a distance ; and the simplicity of the means by which I saw you reply to them, and which I felt that I could myself master in five minutes, produced even in me something of the feeling of magic. I received immediate conviction of the possibility of conversing at a distance of 100 miles as quickly as a word can be spelled ; and upon cool reflection I now feel satisfied that, not only must the telegraph be adopted upon all railroads immediately, but that it will very speedily be had recourse to upon an extensive scale for private communications between great commercial stations.

“ Sincerely hoping that you will escape the fate of most great inventors, and reap some substantial advantages from your ingenuity and perseverance,

“ I remain, dear Wheatstone,

“ Very faithfully yours,

“ (Signed) J. F. DANIELL.”

“ *To Professor Wheatstone, &c. &c. &c.*”

In his agreement with Mr. Cooke, Mr. Wheatstone retained the exclusive right of obtaining Brevets for these inventions in certain countries of the Continent. In pursuance of this he obtained a brevet in Belgium, and in the February following the subject was brought to the notice of the Brussels Academy by Professor Quetelet. After an historical retrospect, M. Quetelet proceeds :—

“ M. Wheatstone fut conduit à son invention par les belles expériences qu’il fit, il y a six ans environ, dans la vue de mesurer la vitesse de transmission de l’électricité et qui furent consignées dans les *Transactions philosophiques* de la société royale de Londres pour 1834. Il trouva que cette vitesse était d’environ 200,000 milles par seconde. Pour faire ces expériences, il n’avait employé qu’un fil conducteur d’un demi-mille ; plus tard, il employa des fils de plusieurs milles de longueur. L’occasion qu’il eut de juger des effets produits par l’électricité voltaïque et par le courant magnéto-

électrique sur d'aussi grands circuits, lui donna la conviction que les communications télégraphiques ne devenaient pas seulement possibles, mais très-praticables. Il se mit donc à étudier l'appareil le plus convenable pour réaliser son projet, et il réussit de la manière la plus complète par les procédés suivants :

“ Au moyen de cinq fils conducteurs seulement, entre deux stations éloignées, M. Wheatstone peut indiquer instantanément les différentes lettres de l'alphabet, et les transmettre au nombre d'environ 30 par minute ; plusieurs même peuvent être transmises à deux en même temps. Les mêmes fils servent à la fois pour donner et recevoir des communications, sans qu'on doive modifier en rien l'appareil. Au moyen des cinq fils conducteurs agissant sur cinq aiguilles, dont les mouvements se combinent deux à deux, ou trois à trois, M. Wheatstone produit environ deux cents signaux différens.

“ Qu'on se figure deux petites chambres éloignées de plusieurs milles de distance, et dans chacune un observateur, assis devant un petit instrument qui porte autant de touches qu'il y a de lettres dans l'alphabet. Sur le mur et en face de lui, se trouve suspendu un tableau sur lequel sont lisiblement écrites les lettres de l'alphabet. Quand il met le doigt sur une touche de l'instrument, le caractère qui y répond est distinctement mis en jeu sous ses yeux, et il se manifeste de même pour l'autre observateur dans la station opposée (car la vitesse de l'électricité échappe à toute appréciation). L'appareil sert avec une même facilité la nuit et le jour ; ni les tempêtes, ni les nuages, ni les brouillards ne peuvent empêcher ses indications ; on en a fait l'essai dans toutes ces circonstances.

“ On a établi une ligne télégraphique d'après le nouveau système, sur une distance d'un mille et demi dans la direction du chemin de fer de Londres à Birmingham ; et de plus, des expériences temporaires ont été faites dans lesquelles les fils conducteurs avaient près de vingt milles d'étendue. Les dernières expériences ont été faites conjointement avec M. Cooke, qui sera chargé de tout ce qui concerne les lignes télégraphiques électriques de l'Angleterre. M. Cooke avait lui-même inventé un télégraphe électrique très-ingénieux, mais qui a été remplacé par celui dont nous venons de donner une idée.” * * *

The facts being, as M. Quetelet has here detailed them, Mr. Cooke therefore had no right to call upon Mr. Wheatstone, as in effect he did in his letter dated August 22nd, 1838 (quoted on p. 23 of his pamphlet),

to divide with him the credit of Mr. Wheatstone's exclusive invention. If Mr. Wheatstone, previous to the taking out of their first patent, may have used the expression that 'they should stand *on an equal footing* as inventors,' he meant solely that, as was then contemplated, they would each have a separate invention specified in the patent, without intending to refer to their relative importance. It was far indeed from his intention that Mr. Cooke should suppress his instrument, and then claim to be the joint-inventor of Mr. Wheatstone's. On the other hand, Mr. Wheatstone, and every one else, might be at a loss to understand what Mr. Cooke meant when he claimed to have been "the individual projector of the system." There is no magic in terms, and nothing in such a phrase which could attribute to Mr. Cooke the merit either of the first conception of electric communication, or of devising the instrument by which it was first made popularly available*.

* It may be here mentioned, though a divergence from the main subject, that Mr. Cooke was so unwilling that the merit of the latter should be ascribed to Mr. Wheatstone that he thus acted in disregard of Mr. Wheatstone's rights and feelings. With the view, as Mr. Wheatstone is compelled, though reluctantly, to believe, of justifying the association of his name with Mr. Wheatstone's upon the instruments in question, he made some trifling alterations, by which the simplicity and symmetry of Mr. Wheatstone's arrangement was destroyed, while no advantage whatever was obtained. This done, he placed his name first on all the instruments, giving the erroneous impression to the visitors of the railway that he had not only a share, but the most important share in their invention. What Mr. Wheatstone conceives justifies his view of this transaction is, that although by an express stipulation in their agreement he should have been consulted on any proposed modifications in the instruments, and possessed the right of objecting to such, his opinion on the subject was never asked, and all the instruments for the railway were

The fallacy of Mr. Cooke, considered simply as a fallacy, appears to consist in this: that because his instrument included a Reciprocal Communication, and Mr. Wheatstone's included the same, "Mr. Cooke's principle" was the basis of Mr. Wheatstone's system. This fallacy includes, first, an error in fact, for Mr. Cooke's "principle" was no novelty, having formed part of previous inventions, as has been already stated; and especially having been developed completely and effectively by Mr. Ronalds, in his telegraph, the description of which was published as early as 1823. Secondly, if this had not been the case, it would be inconsequent to assume that Mr. Wheatstone derived this principle from Mr. Cooke, for it could not have escaped the attention of any person engaged on an electric telegraph, if the mechanical arrangements of the instruments had rendered it at all possible. To a mistake in fact, then, combined with a mistaken inference, Mr. Cooke's claim to share the credit of Mr. Wheatstone's invention immediately collapses on the slightest examination.

The collateral arguments of Mr. Cooke in support of this claim are equally susceptible of an easy explanation. In page 35 of his pamphlet, he lays eager stress on the fact that his name was permitted in the first patent to precede that of Mr. Wheatstone. To this it may be replied, firstly, that Mr. Cooke had effected this arrangement without Mr. Wheatstone's assent, and that Mr. Wheatstone subsequently expressed his disapproval of the proceeding; secondly, that at the time of applying

finished before he knew that any alterations were contemplated. He then expressed his strong disapproval of these alterations; but as great inconvenience and some expense would have been incurred in them, he could do no more.

for the first patent, Mr. Wheatstone anticipated that Mr. Cooke's instrument would be included in, though it was subsequently omitted from, the specification; and thirdly, that it is not an uncommon practice, where two persons are associated together in a patent, that the party on whom the management of the business devolves should take the lead, without reference to his claims as an inventor. Such was the case in the instance of Boulton and Watt, and others which it would be easy to adduce: but who, on the ground of his name taking the lead in the patent, attributes to Boulton the invention of the steam-engine? Mr. Cooke has insisted on a parallel case which the world has with justice similarly construed.

Mr. Cooke makes a second point of his statement: that at the outset the partnership account was charged in his favour with £130 for the expenses of his past experiments, without any allowance to Mr. Wheatstone for any past experiments of his. But his statement is incomplete, for the facts were as follows: Mr. Cooke had several instruments which he had been at some expense in constructing, and whatever might have been their presumed utility, he proposed that these should be included in the item of £130, which sum was to be paid out of the future profits of the enterprise. As an inducement to acquiesce in this proposal, Mr. Cooke informed Mr. Wheatstone that a portion of these instruments would be his, and that he might add them to his collection at King's College. The reason Mr. Wheatstone made no similar demand on Mr. Cooke was this,—that it would have been exceedingly inconvenient on many accounts to have given Mr. Cooke a joint property in the apparatus which

Mr. Wheatstone employed for his experiments at King's College.

The inferences which Mr. Cooke deduces from the Award of the arbitrators to whom his claim was submitted will be referred to presently. That Award was made subsequently, not only to the patent already mentioned, but also to the Patent of 1840, which has yet to be described, and of which the following are the important particulars. Mr. Wheatstone, not content with what he had accomplished, but having in the meantime pursued his experiments, had endeavoured, first, to ascertain whether it was possible to construct an efficient telegraph with a single circuit, all preceding efforts to this end having failed. With this object in view, one of his earliest ideas was to adopt the principle of Mr. Ronalds' Chronometric Telegraph; but by substituting a magnetic needle for Mr. Ronalds' electrometer, and by using its double motion to point to letters on two concentric circles, seen through apertures placed before the dial, the number of signals were doubled, while the advantages which current possesses over static electricity for these purposes were obtained. But an instrument thus constructed would still be too limited in the number of signals it could make in a given time, for it would be difficult to obtain more than eight in a minute. After the period of the first patent it occurred to Mr. Wheatstone that either the dial, or a hand pointing to characters on a fixed dial, might be caused to move by the action of the magnetic needle itself. This he succeeded in effecting, and by means of a wheel which alternately inverted the currents, he was able to bring the index or dial almost instantly to indicate any character, so that the limit to the rapid succession of characters was

the time required to read them distinctly. On this plan he found that about thirty letters could be read in a minute.

About this time, following out the beautiful theory of electric currents established by Professor Ohm, and which at that period was scarcely known in this country, and not sufficiently recognized in his own, Mr. Wheatstone succeeded in constructing electro-magnets possessing power sufficient for delicate movements, and which acted at very considerable distances from the source of the power. He applied the electro-magnets so constructed, in lieu of the magnetic needle, to move a hand or dial, and succeeded in producing the same result as in the former case, by a communicator or wheel, which simply interrupted the current instead of alternately inverting it. He also constructed a modification of this instrument, in which, instead of the hand or dial being impelled into motion by the action of the electro-magnet, an escapement with a maintaining power was employed, by which substitution a greater certainty and regularity of action in some cases was obtained. His improved electro-magnets enabled him to ring alarums at very considerable distances without the intervention of the secondary circuit which was formerly employed. He also applied a modification of the magneto-electric machine, instead of the voltaic battery, to work the new telegraphic instruments.

It was not till Mr. Wheatstone had completed these instruments, without any assistance from Mr. Cooke, that he showed them to that gentleman. When Mr. Cooke had seen them, it was agreed to by him that Mr. Wheatstone should take out a patent for them for their joint benefit, according to a proviso to that effect

in the agreement of November 1837; and for some time there was no evidence on the part of Mr. Cooke that he contemplated putting forth the claims he has since done, or that he imagined Mr. Wheatstone's new instruments were founded upon his. He said nothing about any improvements in which he was himself engaged; while even the letter he wrote subsequently, to which the reader's attention is particularly requested, will show the light in which he regarded the improvements of Mr. Wheatstone, though by this time he had conceived the desire to incorporate what he terms a principle of his own, which without those improvements, he admits to have been of no practical value.

"Sussex Cottage, Slough,
December 11th, 1839.

"MY DEAR SIR,—I forward herewith the copy of a drawing, including a principle which I wish to enter in the patent you are about to take out. It is founded on my instrument made in 1836, and requires only your magnet, with your plan of sustaining a constant current to render a working Telegraph of considerable power. If entered in the Patent, your name will of course take the lead, as the inventor of so many valuable improvements, *and indeed of those very points which render the principle alluded to above of practical value.* Your capstan communicator will also be perfectly applicable to my plan of Telegraph.

"The principle is that the cause of motion depends on the cessation of retentive magnetic action, which I understand to be the converse of yours. The advantage is, that, at the minimum distance, where I only require the minimum of attractive or retentive power, I obtain the maximum, and have therefore so much the more power to spare.

"It is understood that you take the specification entirely in your own hands, I supplying my portion, which, for distinction, had better be kept separate, and our drawings on distinct sheets, with our names attached*.

* The 1st, 2nd and 4th sheets of the drawings of the specification of the Patent of 1840 contain Mr. Wheatstone's inventions, the

"We will add the following clauses to our general agreement, viz. :—

"1stly. That you will alone furnish the instruments included in your part of the new patent.

"2ndly. That you will have the option† of fixing your name to the same instruments.

"3rdly. That you will have the sole privilege of disposing of the instruments, and granting licences for their use for private-houses, manufactories and public establishments, whether they be applied within the buildings, or to connect lodges, out-houses, &c. with the main buildings or with each other. The application of the telegraph to docks, harbours, fortifications, and railway termini, to be under the old arrangement, on the same conditions as the general telegraphic lines.

"As soon as you are prepared, we will try your instruments in any way you wish, on the Great Western and Blackwall lines, and elsewhere as opportunity offers.

"I am, my dear Sir,

"Yours very truly

"W. F. COOKE."

As to Mr. Wheatstone's improvements, which were to be the main subject of the patent, there is not a word in this letter which indicates any claim, or any impression, even on the part of Mr. Cooke, that they were in any way whatever derived from himself. In the same letter he confirms his consent, previously given, that the new instruments Mr. Wheatstone had shown him, should be called Mr. Wheatstone's instruments, and that his name alone should be engraven upon them. Could there be

3rd contains the matter added by Mr. Cooke. Mr. Wheatstone's instruments, and others founded upon them, have been in extensive use on the continent; but Mr. Cooke's have never been employed, and he has published no description of them.

† An agreement was drawn up almost contemporaneously which included among the other stipulations of this letter, the proviso that Mr. Wheatstone was "to have the *right* of placing his name on the new instruments."

a more distinct acknowledgement that these were Mr. Wheatstone's exclusive inventions, than Mr. Cooke's agreement that Mr. Wheatstone's name should alone appear on instruments, which, in a pecuniary point of view, were to remain their joint property? This is not like the priority of names in a partnership deed or a patent, an unimportant incident, but an unimpeachable demonstration. In a subsequent letter, dated December 16, 1839 (also in Mr. Wheatstone's possession), Mr. Cooke asks Mr. Wheatstone to allow him to make the instruments for the railroads; but in this case also, he adds, Mr. Wheatstone's name *alone* should be placed upon them.

Notwithstanding these admissions of Mr. Cooke, Mr. Wheatstone's title, as the exclusive inventor of his own instruments, was afterwards brought into dispute before arbitrators. Mr. Wheatstone having taken out a Belgian patent, in which he had omitted, as of little importance, the matter introduced by Mr. Cooke, and which, as it was specified separately, according to the proposal in his letters, was rejected without difficulty, Mr. Cooke professed to feel himself aggrieved, that Mr. Wheatstone should speak of his own exclusive instruments (which alone remained) in his own name, and as his own invention. This grievance was wrought into a definite shape in consequence of certain paragraphs which appeared in the English papers. Mr. Wheatstone having proceeded to Brussels for the purpose of receiving a Belgian Brevet for his inventions, exhibited his instruments in action, and his plan of a submarine telegraph, to the principal scientific men and public authorities of the Belgian capital. Through the kind interest taken in his discoveries by his friend Professor Quetelet, an account of these experiments appeared in the 'Bulletin'

of the Brussels Academy* of October 17th, 1840 ; and from notices which appeared in the Belgian journals, reports were also transferred, as it appears, to some of the English papers. *Inde iræ*. Mr. Cooke was no longer contented with sharing the pecuniary profits of Mr. Wheatstone's inventions, but he wished to participate in Mr. Wheatstone's independent reputation.

* "M. Quetelet entretient l'académie des expériences que M. Wheatstone vient de faire à l'observatoire Royal des Bruxelles, au moyen des nouveaux télégraphes de son invention. 'Ces appareils beaucoup plus simples que ceux que M. Wheatstone avait imaginé d'abord, transmettent les signaux avec la rapidité de la pensée, puisque, dans l'espace d'une seconde, ils pourraient faire six à sept fois le tour du globe. D'une autre part, leur volume est si peu considérable, que l'appareil qui donne les signaux, celui qui les reçoit, et la pile galvanique qui fournit la force motrice, peuvent être renfermés sans peine dans une caisse de moins d'un demi-mètre cube ; et leur prix ne s'élève pas au-delà de 25 livres sterling. Deux cadrans circulaires, placés aux deux stations extrêmes, et mis en rapport au moyen de deux fils conducteurs isolés, portent les diverses lettres de l'alphabet. En amenant successivement les lettres devant un indicateur, au moyen du cadran d'où partent les signaux, on fait que ces mêmes lettres se reproduisent instantanément devant un indicateur semblable, sur le cadran où les signaux sont reçus. Trente lettres au moins peuvent être transmises par minute, de manière que l'on fait immédiatement la lecture des mots.

" ' Lorsque les signaux vont être transmis, on a soin, pour appeler dans la station opposée l'attention des personnes qui doivent faire les lectures, de faire sonner un timbre ou alarme. M. Wheatstone a trouvé un moyen très ingénieux pour faire sonner à volonté, même la cloche la plus forte. Si le fil conducteur vient à rompre, il fait reconnaître, par un appareil très simple, l'endroit où la rupture a eu lieu, lors même que le fil se trouverait caché sous le sol†. Une longue expérience lui a fourni toutes les ressources nécessaires pour parer

† This alludes to a process which has not yet been published, while the preceding sentence refers to an entirely new alarm first described in the patent of 1840.

On Mr. Wheatstone's return to England, Mr. Cooke addressed to him a letter complaining of "a paragraph which was going the round of the papers, headed 'Professor Wheatstone's Electric Telegraph,' and containing an account of some of his recent experiments in Belgium." He especially objected that in the account of these experiments, it was stated that two communicating-wires were employed instead of five, without allusion to the presumed fact that the efficiency of the instruments was therefore wholly dependent on a principle which he had discovered. Thus he raised the claim to regard Mr.

aux inconvénients qui peuvent résulter de l'établissement de ces télégraphes, qui, du reste, fonctionnent déjà en Angleterre depuis plusieurs années, sur des étendues plus ou moins longues de chemin de fer. On sera sans doute charmé d'apprendre que l'auteur a trouvé le moyen de transmettre les signaux entre l'Angleterre et la Belgique, malgré l'obstacle de la mer. Son voyage se rattachait en partie à cette importante opération, qui mettrait l'Angleterre en rapport immédiat avec notre pays, la France, la Hollande, l'Allemagne, et même la Russie.

" ' Sous le point de vue scientifique, les résultats qu'on peut recueillir des télégraphes électriques de M. Wheatstone sont immenses. Ainsi, pour les localités par où passera la ligne télégraphique, la détermination des longitudes, l'une des opérations les plus délicates de l'astronomie pratique, n'offrira plus la moindre difficulté. D'une autre part, d'après une disposition particulière, une pendule peut donner l'heure à toute une maison, à toute une ville, même à tout un pays : les pendules auxiliaires qui marquent les heures, les minutes, les secondes aux mêmes instants que la pendule régulatrice, ne se composent que d'un simple cadran : aussi M. Wheatstone les nomme squelettes de pendules. L'auteur compte aussi employer ses procédés pour mesurer, avec une précision qu'il croit pouvoir porter à un centième de seconde, la vitesse des projectiles. Il serait difficile de limiter les applications auxquelles se prêteront les ingénieux appareils de M. Wheatstone. Néanmoins l'un des plus beaux titres scientifiques de l'auteur, sera toujours d'avoir mesuré l'incroyable vitesse du fluide électrique qu'il devait employer si heureusement plus tard. ' "

Wheatstone's instruments, because they required a single circuit only, as mere improvements on former attempts of his, which he had consigned to oblivion,—a claim which may be said to be quite as unfounded as his pretensions to have invented the reciprocal system. Previous to the date of their first patent, Ronalds', Gauss and Weber's, and subsequently, Steinheil's and Morse's telegraphs all acted in a single circuit; and Mr. Cooke had to vindicate his claim against all these before he could set it up as a bar to Mr. Wheatstone. Nevertheless he stated his intention not to confirm the agreement relating to their new inventions, unless Mr. Wheatstone allowed a recital to the effect—"That his (Mr. W.'s) new instruments were improvements on their joint invention, and depended fundamentally upon principles first discovered and applied by himself (Mr. C.), and since worked out by each separately in forms essentially distinct." This admission Mr. Wheatstone refused to make, for he could not have made it conscientiously. It would have placed him moreover in the inconsistent position, on the one hand, of having the right to describe his instruments as his sole invention, while, on the other hand, Mr. Cooke would have possessed his legal acknowledgement that they were invented conjointly. Mr. Wheatstone claimed as an indisputable right to call his own researches, discoveries, and inventions his own, and to publish them when and in what manner he thought proper. Yet, as he would not consent to waive this right, Mr. Cooke subjected him to the legal duress of a refusal to confirm this and other exclusive rights which Mr. Cooke had already undertaken to admit by his letter of December 11th.

The Answer of Mr. Wheatstone to the letter of Mr.

Cooke, in which this issue was raised, is printed in the Appendix (Letter A.), and to this the attention of the reader is especially directed. In reply to Mr. Cooke's proposal of an arbitration on the subject of their differences, Mr. Wheatstone, on his part, wrote a second letter, "granting, or rather demanding," the arbitration Mr. Cooke had called for, and requiring that it should be made binding by the proper legal forms. Accordingly an agreement of reference was drawn up, in which the arbitrators were instructed to investigate, and conclusively determine by their written award, in what shares, and with what priorities and relative degrees of merit, the copartners stood in relation to the inventions which formed the subject of the patents, due regard being paid to the original projection thereof, to their scientific development, to their practical introduction, and to the improvements made thereon; and they were empowered either to award simply to the effect that the parties stood upon equal terms, or that one stood superior to the other, or to enter into details, distinctions and reasons. The consideration of Mr. Wheatstone's separate rights, as they were termed,—the substantial subject of the arbitration, was even agreed to be postponed until the relative positions of the parties were defined. The two gentlemen who consented to undertake the office of arbitrators were Sir M. I. Brunel, on the part of Mr. Cooke, and Professor Daniell on the part of Mr. Wheatstone.

It is not immaterial, as an evidence of the animus of Mr. Cooke, to mention the course of conduct which he thereupon adopted. The proceedings had scarcely commenced when it was evident that he intended to carry them on in a most expensive and vexatious manner. In

the first place, without consulting Professor Daniell or Mr. Wheatstone, his solicitor took upon himself to engage as third arbitrator, a counsel of great legal eminence, but unacquainted with scientific matters; and this arrangement was only prevented from being carried into effect by the objections of Professor Daniell and of Mr. Wheatstone's solicitor. In the next place, after the cases of the parties had been exchanged, Mr. Cooke took upon himself to engage a short-hand writer; and as he appeared to contemplate other expensive proceedings, the arbitrators intimated, according to the statement of Mr. Cooke's solicitor, that they "strongly objected to the course in which Mr. Cooke's case was being brought before them;" in fact, Sir M. I. Brunel himself, in a letter to that gentleman, distinctly recorded his disapprobation of the proceedings. The next step of Mr. Cooke was to print *one thousand copies* of a quarto volume containing the two statements, accompanied by an address of his solicitor in reply to Mr. Wheatstone's case, without the fair accompaniment of Mr. Wheatstone's reply to Mr. Cooke's case. This address, when it was presented, was condemned for its form and spirit so strongly by the arbitrators, that they refused to proceed unless it was withdrawn, and the printed papers placed at their disposal. Mr. Cooke's solicitor, indeed, attempted to represent the printing of this volume as required by the arbitrators, but Professor Daniell strenuously repudiated, by letter, having given any, even indirect, sanction to this expensive process; and Mr. Cooke's solicitor consequently withdrew the volume.

As the case proceeded, Sir M. I. Brunel and Professor Daniell agreed to appoint Dr. Roget as third arbitrator. To this course they had the inducement of Dr. Roget's

eminent qualifications in many respects, but especially of his intimate acquaintance with electro-magnetic science; and as he had been mentioned by Mr. Cooke as having been acquainted with his views previous to his introduction to Mr. Wheatstone, there was a more than ordinary propriety in Dr. Roget's selection. Nevertheless, against this appointment Mr. Cooke and his solicitor remonstrated, on the ground "that the question to be tried was *not* a scientific question"—a ground inconsistent with the agreement of reference to which Mr. Cooke was a party, and grossly—even ridiculously inconsistent with the use which he now attempts to make of the award. As was to be expected, the arbitrators would not admit this remonstrance as offering a sufficient ground to alter their decision, which they were prepared to maintain; but before the appointment of Dr. Roget was definitively settled, Mr. Cooke had made proposals for an "amicable arrangement." The length of time these proceedings had lasted, and their expected protraction in consequence of the course pursued by Mr. Cooke, the great expenses incurred, with the apprehension of Mr. Wheatstone as to his ability to meet them, the anxiety and trouble cast upon the arbitrators, whose time was of the utmost value, and the injury to the interests of the partnership from this prolonged litigation, had altogether a natural influence upon Mr. Wheatstone, and induced him readily to listen to Mr. Cooke's proposals.

In consequence of these proposals a compromise was effected, and an Award consisting of two documents, to the terms of which both parties previously assented, was signed by the arbitrators. But without laying stress on the obvious fact, that what Mr. Cooke properly terms "a

treaty," was substituted for the independent verdict of the arbitrators themselves, it is important to observe the terms of the Award as agreed upon. It is especially important to observe, that its main practical conclusion, which Mr. Cooke, abstaining from all reference to the document which contained it, quietly, but advisedly, omits from his statement, was altogether in favour of Mr. Wheatstone. That which may properly be called the substance of the Award, and which Mr. Cooke does not venture to face, while he is pursuing its shadow, was to this effect:—That Mr. Wheatstone's "separate privileges," which included the right of putting before the public, *as his own*, the inventions described on the 1st, 2nd and 4th drawings of the specification of the patent of 1840, should be confirmed, and that a proper deed should be executed for the purpose of securing them*. The agreement which contained this provision was signed by both the parties and the arbitrators; and it also covenanted that Mr. Cooke's printed papers "should be placed at the disposal of the arbitrators," which was accordingly done; and as Mr. Wheatstone was informed, they were burnt at the

* Mr. Cooke had previously proposed, as conditions of the settlement, that Mr. W.'s exclusive privileges should be rescinded, and that the names of Cooke and Wheatstone should appear equally on all the patent instruments; and in compensation thereof the partnership was to pay him £1000 out of the future proceeds. These proposals were rejected; the exclusive privileges were confirmed by the arbitrators, and Mr. W. retained the right to claim his inventions as his own. Mr. Cooke also proposed (letter from Mr. Wilson to Sir M. I. Brunel, April 19, 1841) that he should be nominated by the arbitrators and Prof. Wheatstone as a candidate for election to the Royal Society, stating that if this request were not acceded to, he might find it necessary to make some modification in his "concessions." This proposal was indignantly rejected by the arbitrators.

Thames Tunnel. It was also agreed that the expenses of both parties should be paid out of the proceeds, by which the expenses of both Mr. Cooke and Mr. Wheatstone, whatever might be the difference in their amount, were to be borne by Mr. Cooke until the inventions became profitable, which at this time they were not. Some other matters of business, which it is not material to mention, were included in this document, which was substantially the Award of the arbitrators.

At the same time Mr. Wheatstone was required to sign the paper which Mr. Cooke has quoted at length, and from which he draws such unwarranted conclusions, whereby Mr. Wheatstone acknowledged Mr. Cooke's position in relation to himself, and to the Electric Telegraph generally. Mr. Wheatstone did, however, object at the time to the wording proposed by Mr. Cooke, as likely to lead to misconception; but as it contained no real discrepancy with his own statements on the same subject, he consented that it should stand. The point which Mr. Wheatstone regarded as of primary importance was already gained, and Professor Daniell concurred with him, that having that, he had little to fear from any misrepresentation. As Mr. Cooke, however, places some emphasis on the subsequent acknowledgement of Mr. Wheatstone's solicitor, that his client "does not desire to escape from a single conclusion which the Award warrants," and as Mr. Wheatstone entirely adheres to this acknowledgement, and contentedly accepts all that it does warrant, he will assist Mr. Cooke in furthering its fair construction.

Thus it states, "that Mr. Cooke is entitled to stand alone;"—(presumably in capitals or italics, if he pleases;) but to stand alone in what capacity?—"as the gentle-

man to whom this country is indebted for having practically introduced and carried out the Electric Telegraph, as a useful undertaking, promising to be a work of national importance." Mr. Cooke may fairly take an honourable pride in this testimony to his practical discernment and business capacity; and no one will be more willing than Mr. Wheatstone has ever been to acknowledge that in this sense he has been the main-spring of their enterprise. Mr. Cooke is entitled to stand alone, with the assent of the arbitrators, for conceiving, and energetically following up his conception, that the Electric Telegraph might be made a profitable commercial enterprise, and for his having carried out an undertaking of such great importance to the public. His talents and zeal, his experiments, his negotiations, his mechanical and business arrangements, entitle him to stand alone to every intent and purpose which the language of the Award warrants; but they do not sustain his claim on page 9 of his pamphlet to be "the originator of the Electric Telegraph;" nor does the Award carry him one inch in support of this illusion; for it describes him simply as "*originator of the undertaking.*" Originator of the undertaking! It is the title, in fact, of any one who first plans a steam-ship or promotes a railway; it includes no pretensions to the invention of steam transit in either case. Mr. Cooke is therefore, mistaken if he interprets his designation in any transcendental sense of this sort. He demands, indeed, to be the first of telegraphic inventors, and the Award allows him to be the first of undertakers; and he cannot see, or professes not to see, the distinction.

In the sense of the Award, Mr. Cooke may stand alone (*stat æternumque stabit*), without the slightest com-

plaint from Mr. Wheatstone. "Mr. Wheatstone is acknowledged" in the same document "as the scientific man whose profound and *successful* researches had already prepared the public to receive the Electric Telegraph as a project capable of practical application;" and the rapid progress of this invention is fairly attributed "to the united labours of two gentlemen so well qualified for mutual assistance." Mr. Wheatstone, however, has laid no particular stress on this testimony, for he has other means of proving by what particular inventions and discoveries, exclusively and purely his own, he is entitled to associate his name with the Electric Telegraph. He is, in fact, preparing an account of the whole series of his operations in this behalf, which he will hereafter lay before the scientific world, as a subject adapted for their special cognizance. If Mr. Cooke will follow his example, his merits will be judged by a competent tribunal; and his efforts in this direction would be more appropriate than his appeal to the promiscuous passengers on the railways of the United Kingdom.

But Mr. Cooke, who complains of Mr. Wheatstone's vindication of his proper claims, has already obtained more than his own share of credit, and especially from the document to which reference has just been made. Immediately after it appeared he circulated it extensively, without any allusion to the more important and operative part of the Award, by which it was accompanied. In furtherance of his construction, his solicitor, in a letter to a friend of Mr. Wheatstone, dated May 5, 1843, asserted "that Mr. Cooke was in the right, and Mr. Wheatstone in the wrong;" and that the signing of the statement in question, coupled with the fact of the expenses of the arbitration, "Mr. Cooke's amounting to several hundred

pounds," being paid out of the proceeds of the invention, proved that this was the case. To protect himself, therefore, from this summary and unjust conclusion, Mr. Wheatstone wrote to Professor Daniell, to ask him whether the inferences thus put forward were correct. Professor Daniell's letter, which is subjoined, is the "alarming document" of which Mr. Cooke speaks in page 41 of his pamphlet, and of which he appears to feel a salutary apprehension. His question—"how Mr. Daniell could reconcile any such letter with the character of a judge," may be easily answered. Professor Daniell had learnt the unfair construction which Mr. Cooke sought to put upon his judicial act; and in accordance with the "manly and upright character" which Mr. Cooke allows to him, he performed a necessary incident of his judicial duty. His letter, written to sustain the true and to repel the false interpretation of his verdict, may be left, however, to justify itself, at the same time that it will properly conclude this explanation of the relative positions of Messrs. Cooke and Wheatstone.

" King's College, London, May 24, 1843.

" MY DEAR WHEATSTONE,—In reply to your note of yesterday, I beg to state that I have a perfect recollection of all the circumstances under which the 'Statement of Facts' regarding the Electro-Telegraph was agreed to, and signed by Sir M. Isambard Brunel and myself. You have, not quite correctly, called it an 'Award' of the arbitrators; for, strictly speaking, the arbitration was not proceeded with. The arbitrators, considering the pecuniary interests at stake, and the relative position of the parties in those respects, were of opinion that, without entering into the evidence of the originality of the inventions on either side, a statement of facts might be drawn up, of the principal of which there appeared to be no essential discrepancy in the statement of either party, which might amicably settle the unfortunate misunderstanding which had occurred. It was with a view to promote such an amicable settlement that the arbitrators in-

sisted, as a preliminary step, upon the withdrawal and destruction of 1000 printed copies of an *ex-parte* statement of evidence proposed to be brought forward, and of a most intemperate address prepared by Mr. Cooke's solicitor. This having been complied with, the 'Statement' in question was agreed to, and signed both by the arbitrators and joint-patentees.

"This document makes no assertion whatever as to the originality of the inventions on either side, neither was it necessary nor expedient that it should do so; for, whenever you and Mr. Cooke may think it advisable to publish the details of your several inventions, the scientific public will want no guide in forming their own opinion upon their resemblances, differences and merits.

"Intimately acquainted as I am with the particulars and progress of your own undoubted inventions, I have no hesitation in expressing to you upon paper the opinion which I have always expressed to others, viz. that they are of incomparable beauty and simplicity, and by themselves sufficient to supply all the purposes of the most extended telegraphic communication. I will moreover repeat that which I have already published in my 'Introduction to Chemical Philosophy,' viz. that your contrivances would have been of no avail for telegraphic purposes without the investigation which you were the first to make, of the laws of electro-magnets when acted on through great lengths of wire.

"I remain, my dear Wheatstone,

"Ever faithfully yours,

"(Signed) J. F. DANIELL."

"To Professor Wheatstone, &c. &c. &c."

It is only necessary to add that Mr. Wheatstone has ever been contented with the position thus assigned to him, and which is fairly his due, and that he has never on any occasion sought to detract from the position of Mr. Cooke. In his evidence before the Select Committee on Railways given in February 1840, and of which Mr. Cooke so ungraciously complains, he repeatedly coupled Mr. Cooke's name with his own, as the following extracts testify:—

"297. You have turned your attention for some time to the

means of communicating intelligence by means of wires, by electricity ?
—I have.

“298. You have tried experiments to that effect to a considerable extent, have you not ?—I have been engaged in this inquiry for some years past, *and in conjunction with a gentleman, Mr. Cooke, who has turned his attention to the same subject*, I have within that time taken out several patents for the means of effecting this object, and the experiments have since been carried to a considerable extent on the Great Western Railway.

* * * * *

“304. Will you have the goodness to describe to the Committee the mode in which you propose to communicate intelligence between two distant points, as alluded to by you ?—I have here a drawing of the specification to the first patent taken out by myself *and Mr. Cooke*. In all essential particulars the instrument here represented resembles the one at the Great Western Railway, &c.

* * * * *

“320. Some arrangements are here represented, to which *Mr. Cooke* has particularly directed his attention ; they relate to the means of establishing communications at intermediate parts of the line where no fixed stations exist, &c.

* * * * *

“342. There is one thing I will take the opportunity to mention : I have been confining the attention of the Committee to the telegraph now working on the Great Western Railroad ; but having lately occupied myself in carrying into effect numerous improvements which have suggested themselves to me, I have, *conjointly with Mr. Cooke, who has turned his attention greatly to the same subject*, obtained a new patent for a telegraphic arrangement, which I think will present very great advantages over that which at present exists,” &c.

Thus it is difficult to explain in what sense Mr. Cooke has discovered that, “as corrected and printed, this evidence is objectionable ;” for it was evidently not so from any disinclination of Mr. Wheatstone to keep Mr. Cooke’s name continually before the Committee, the above extracts occurring in the space of four pages. Again, in the ‘Bulletin’ of the Brussels Academy, for which account only of his experiments in that capital

Mr. Wheatstone is responsible, so far from never "once intimating his connexion with a partner," Mr. Wheatstone supplied to M. Quetelet materials for the following statement, already mentioned:—"Les dernières expériences ont été faites conjointement avec M. Cooke, qui sera chargé de tout ce qui regarde les lignes télégraphiques de l'Angleterre. M. Cooke avait lui-même inventé un télégraphe électrique *très ingénieux*, mais qui a été remplacé par celui dont nous venons de donner une idée." Mr. Wheatstone is not responsible for every minute statement in the article in Chambers's Journal, though he showed some experiments to the writer; nor for that in a recent Number of the Quarterly Review; nor indeed for any article which has not been submitted to his inspection, or of which he has not himself ascertained the correctness.

While Mr. Wheatstone has on no occasion, that he can call to mind, omitted to make a liberal mention of Mr. Cooke, he might easily, if he had leisure for such an occupation, collect instances in which Mr. Cooke has not been equally considerate to him. In an article on the Electric Telegraph, also in Chambers's Journal, June 7, 1845, it is stated that, "fortunately Mr. Cooke, *the inventor, who, with the assistance of* Professor Wheatstone, has brought the instrument to its high condition of usefulness, was in the room, and readily explained to the writer not only the nature, but the origin and progress of the invention." Mr. Cooke appears to have overlooked Mr. Wheatstone entirely in his communication with Mr. Leithead, author of a work on Electricity which was published as early as 1837*. Even in the

* "On the principle of the action between electric currents moving along conducting wires and magnets, are founded the various con-

eventful year 1854, Prince Menschikoff was not the only person who was parading questionable pretensions at Constantinople. On April 15, Lord Carlisle mentions in his diary that he "called on Lord Stratford, and found with him Mr. Yeames, our Consul from Odessa, where he had lived for forty years, and Mr. Cooke, *inventor* of the Electric Telegraph."

If Mr. Cooke has now, to use his own expression, "the humiliation of retiring from a position, in which he ought never to have allowed himself to be placed," Mr. Wheatstone was willing to have spared him its publicity. Mr. Cooke has himself obtruded their past differences on the world, and has rendered this reply necessary to Mr. Wheatstone's vindication, and he must submit to hear the answer his attack has elicited. Mr. Cooke proposes further to reprint his *ex parte* volume containing some collateral imputations on Mr. Wheatstone, founded on his own confusion of dates and transactions, and which Mr. Wheatstone may, or may not, think it worth his while to notice. At all events, for the present he is content to leave the question thus. He has independently worked out his own inventions, and he claims the credit of particulars which he can clearly specify. If Mr. Cooke prefers to confound their respective contributions to the Electric Telegraph, the relative value of which the scientific world can estimate, and then, under the name of "originator," "projector," or any other title as sonorous and equivocal, to assume to himself the chief

trivances for effecting telegraphic communication. The most complete and successful method is that of Mr. Cooke, through whose polite attention we were favoured with a view of the apparatus, and had the pleasure of witnessing the experiments on the London and Birmingham Railroad."—*Leithead on Electricity*, p. 217. London, 1837.

merit of the invention as if it were entire and indivisible, he will indulge in the satisfaction henceforth at his own risk. Mr. Wheatstone will not consent to waive his claims in Mr. Cooke's behalf; and in the statement he has yet to make, will maintain, as he has ever maintained, his title to the definite position conceded to him as "the first contriver of the Electric Telegraph in the form which made it available for popular use." Having thus put his claim on record, with some of the data which substantiate it, he leaves it for the present, without further observation.

And here this pamphlet should have concluded, having exhausted all the relations of Messrs. Cooke and Wheatstone which possess any other than a purely personal interest. But Mr. Cooke has ventured upon a further statement of the pecuniary incidents arising from these inventions, and Mr. Wheatstone, to protect himself from its misrepresentations, is himself obliged to disclose the true circumstances of their connection in this respect. In doing so he will be under the necessity of publishing matters which are private, but he is satisfied that Mr. Cooke has left him no alternative; he was far from desirous himself of obtruding them on the public; nor is he responsible if, when faithfully stated, they should be found to discredit Mr. Cooke's pretensions, or to convict him of a want of candour in his mode of presenting them.

Mr. Cooke, in his pamphlet, labours to convey the impression that throughout these transactions he treated Mr. Wheatstone with extreme liberality: but of this the reader will judge when he hears all the circumstances. How it came that in respect of patents in which they

were at first jointly interested as tenants in common, Mr. Cooke, on the transfer of their respective rights, received for them £150,000, while Mr. Wheatstone, for his share thereof, received only £30,000, will be explained in answer to the professions of Mr. Cooke. Mr. Wheatstone has no doubt that in the approximation to this result the steps which Mr. Cooke took were invariably legal. He is further ready to admit that Mr. Cooke may have felt himself justified in obtaining, if he could, what he modestly termed in his evidence before the Privy Council, "*a margin* beyond Professor Wheatstone's" share in the Patent Rights. But Mr. Wheatstone will not allow it to go uncontradicted that he was treated with liberality by Mr. Cooke, for he was not even treated with the ordinary fairness, which is taken to imply open and candid dealing; and what is more, he was induced by engagements, which Mr. Cooke has never performed, to surrender certain valuable rights beyond the terms originally agreed upon, and to submit to be unjustly fettered in his liberty of invention.

The circumstances on which Mr. Wheatstone relies to prove the first of these statements are succinctly as follows. The patents for the first invention were granted for England, and subsequently for Scotland, on the respective dates of June 12th and December 12th, 1837: but on the 18th of November, in the same year, an agreement was entered into by the joint Patentees to regulate their relations, and determine their interest as partners. By this agreement it was covenanted (*inter alia*), that the sole management of the invention should rest with Mr. Cooke, who, at the same time covenanted "to use his utmost endeavour to promote the joint-interest of himself and Mr. Wheatstone," subject of

course to discretionary powers as to the degree of attention he should devote to the enterprise. It was agreed that Mr. Cooke might grant licenses for the use of the invention, and that he might also contract for the absolute sale of the patents, subject to Mr. Wheatstone's consent, as to the amount to be received in either case:—That to remunerate Mr. Cooke for his management, and to reimburse him for the expenses of the same, which he was to incur, and from which he indemnified Mr. Wheatstone, he should be entitled to retain 10 per cent. of all the proceeds which should accrue, and that subject to his per-centage, these should be divided in equal shares between Mr. Cooke and Mr. Wheatstone as tenants in common. At the same time it was agreed by *the fourteenth clause* of the Deed, that Mr. Cooke might contract on his separate account for the works necessary for carrying the invention into effect, but he was strictly prohibited from making such contract a preliminary condition in treating for any license, or for the sale of any interest in the patent rights, and from employing his liberty in this respect so as to lessen or affect the price payable on the latter account. By the eighteenth clause it was provided, that in case of the death or physical incompetence of Mr. Cooke, the management of the invention should devolve upon Mr. Wheatstone, and the covenants in this behalf should be construed conversely. Clauses were added to comprise further inventions, and accordingly between the date of this deed and April 12th, 1843, one additional Scotch and four English patents for improvements, &c. were taken out, and came under its provisions as being also the joint property of Messrs. Cooke and Wheatstone.

During the same interval the Electric Telegraph was

brought into operation on the Blackwall Railway, on the Great Western, from Paddington to Slough, in a tunnel between Edinburgh and Glasgow, and was in preparation on the line between Norwich and Yarmouth. But it was not profitable in a commercial sense during this interval. In the meantime Mr. Cooke paid the expenses of the management, which were proportionally limited in amount by the limits of his operations, while Mr. Wheatstone under a further clause in the above-mentioned deed, contributed half the outlay for law expenses, obtaining patents, &c., and on the other hand bore the chief expenses of his further experiments and inventions. In the negotiations for a new agreement, which was concluded on the 12th of April, 1843, and the nature of which will be described, it was arranged that the accounts between the partners up to this date should be considered as settled, though no statement was furnished by Mr. Cooke, except that it was *greatly* in his favour. It is not material to the principal question, but Mr. Wheatstone has since ascertained either that Mr. Cooke's representation to this effect was inaccurate, or that an item not taken into the account is still due from Mr. Cooke to Mr. Wheatstone.

On the 12th of April, 1843, a fresh agreement, as has been already stated, was concluded between them on Mr. Cooke's proposal. Hitherto they had only ascertained that their enterprise was calculated to become eventually profitable, while it was apprehended by Mr. Cooke that misunderstandings and delays might arise from their joint control over each separate contract. To liberate Mr. Cooke's management from this alleged impediment*, it was therefore agreed that Mr. Wheatstone

* That no impediment was likely to proceed from Mr. Wheatstone

should assign 'absolutely to Mr. Cooke all his interest in their patent rights in consideration of a release from all present claims and prospective liabilities, and of a royalty upon all further operations. This royalty was fixed at £20 per mile for the first ten miles laid down in any year, £19 for the second, £18 for the third, £17 for the fourth, £16 for the fifth, and £15 for every mile beyond the first fifty miles. These royalties were to cease with the expiration of the last of the existing patents, but Mr. Wheatstone, on the other hand, was to be entitled to the use of any patents which should be subsequently taken out, and which should be unexpired at the termination of this agreement. A contemporaneous agreement was also signed, which reserved the further right or license to Mr. Wheatstone, to construct and employ the patent apparatus in places not exceeding half a mile in distance, &c. for his own separate benefit. These conditions, coupled with the royalties, were at the time considered by Mr. Wheatstone to be a fair equivalent for his moiety in the patent rights, which was subject to the percentage for management. But indirectly by the operation of the above deed, Mr. Cooke was also freed from the condition which stipulated that he should not be at liberty to make any contracts on his separate account at the expense of the interests of the Patentees; and as the working of this is not immediately obvious, it may be

is proved by the letter of Mr. Cooke's solicitor, dated 14th June 1841, to this effect:—"Mr. Wheatstone might have caused difficulties by refusing to agree to fair and reasonable prices; but experience has shown that not the slightest difficulty has arisen, or is likely to arise, in this respect; Mr. Wheatstone having always, in that important control, fulfilled his trust in a manner as beneficial to the joint concern as it has been gratifying to his partner." (Mr. Wilson to Mr. Richardson.)

explained by a given instance. Supposing Mr. Cooke, as might easily happen, could contract at a greater profit to himself for a line of fifty miles than for a line of a hundred, he had so far an inducement to elect for the contract which would produce Mr. Wheatstone the lesser amount in royalties. Mr. Cooke, in his evidence before the Privy Council, alleges that his share of the patent rights had been less profitable than his employment as a contractor. That it was so, was due to his possession of these very rights, by which he effectually kept other contractors from competing with him. He might calculate his profits on his contracts or on his patents; it made no difference to him, though it made much to Mr. Wheatstone if Mr. Cooke was induced to contract his operations in the latter respect, by requiring an exorbitant profit on the former. At the same time, for the option of shifting his profits to and fro to either of these sources, as also for his command of the sources themselves, he was solely indebted to this agreement with Mr. Wheatstone.

Mr. Wheatstone, however, is not here complaining of the effect of his own deed, but referring to it solely in answer to Mr. Cooke's pretence of liberality. Mr. Cooke says that he was bound by "very stringent clauses" to account to Mr. Wheatstone for his royalties; but the last clause of the deed provided that if in any case these royalties should be deemed onerous, Mr. Cooke should be "at liberty in honour" to propose to Mr. Wheatstone any modification of them. The terms of the Deed, therefore, were not peculiarly stringent as regards Mr. Cooke, and the event will further show that they were not so remarkably liberal in affording protection to the interests of Mr. Wheatstone.

Between April 1843 and December 1845, the Norwich and Yarmouth Telegraphic Line was completed, together with the following lines which were entirely new: London to Gosport and Southampton, 94 miles; Tunbridge to Maidstone, 15 miles; Euston Square to Camden Town, and Wolverton to Peterborough, 59 miles; together with some other lines of less extent. But the increased estimation of the telegraph was principally owing to its adoption by the Admiralty, which undertook to pay a large annual rent for its use, during a definite term of years, and to its consequent establishment on the South-Western line. Its adoption by the Admiralty was entirely due to the exertions of Mr. Wheatstone, as was also the successful opening of the telegraph on the Paris and Versailles Railway in 1845, the first established in France, and which was laid down under Mr. Wheatstone's sole direction. To this mention of the facilities indirectly afforded Mr. Cooke in his management, by the independent exertions of his partner with respect to the Admiralty contract, and to the popularity acquired for the invention by Mr. Wheatstone's operations on the Continent, a field in which at that time no other instruments competed with his, it should be added that a new patent, the principal part of which was furnished by Mr. Wheatstone, was taken out on May 6th, 1845, and tended also to increase the value of the invention.

Mr. Wheatstone consequently received in royalties on the operations of 1844, £444, and on those of 1845, £2775, so rapid was the commercial progress of the electric telegraph. But the account of the latter year was not rendered by Mr. Cooke till after the date of an agreement presently to be mentioned; and before, there-

fore, Mr. Wheatstone was fully cognizant of the increased rate at which profits were accruing, he had parted with his royalties on the terms vaguely described in Mr. Cooke's pamphlet. Mr. Cooke was not indeed scrupulously accurate, when he stated before the Privy Council, with reference to this transaction, that he paid Mr. Wheatstone in full—"he never bargained, or anything of the kind;" for the negotiation which led to the agreement about to be described, was commenced by a letter from Mr. Cooke dated July the 31st, 1845, and which offered to Mr. Wheatstone for his royalties, &c., at least £10,000 less than Mr. Cooke agreed to give for them subsequently. (See Letter of July 31, 1845*.) Again, Mr. Wheatstone is not complaining of this proceeding of Mr. Cooke,

* "Kidbrooke, near Blackheath,
July 31st, 1845.

"MY DEAR SIR,—The proposition I made to you yesterday for the commutation of your Royalty over a large portion of England and Wales may be comprised in the following question:—For what sum paid down now will you commute your Royalty over the whole of England and Wales lying north of the Thames from its mouth to London, and north of the Great Western Railway from London to Bristol, but not including the railway itself, which will remain subject to your Royalty? Say the cash to be paid half within three months, and the remainder within six months more?—I have also to ask you, as a distinct proposition, whether you will accept of the sum of £20,000 as commutation of your Royalty for England, Wales, Scotland and Belgium, and your share in the Irish Patents—and also including the exclusive rights in Great Britain, but not in Belgium,—£10,000 to be paid in four months from this date, and £10,000 six months later?

"I am, yours faithfully,

"WILLIAM F. COOKE."

"P.S. The latter proposition to include all cash settlements pending between us at the present time. As you are, I believe, connected with others in the 'Exclusive Rights,' you can add £1500 in addition to the £20,000 on that score."

"Charles Wheatstone, Esq."

which doubtless was legitimate, but is citing it in reply to the assumption of Mr. Cooke, that he took a liberal and gratuitous care of Mr. Wheatstone's interests. It is further mentioned, because it directly contradicts Mr. Cooke's assertion that "he never bargained, or anything of the kind," for it shows he would have possessed himself of Mr. Wheatstone's interests for a considerably lower sum than he eventually paid, if he could have gained Mr. Wheatstone's consent. If Mr. Wheatstone afterwards obtained considerably more, he was not indebted to the generosity of his acting partner, who stipulated for as much as he could for himself, and at the same time gave as little as he could to Mr. Wheatstone.

As the letter which proves this has been subjoined, it will not be necessary to dwell further upon this point. On the 4th of October 1845, an agreement was framed by which Mr. Wheatstone undertook to assign to Mr. Cooke his royalties and rights, under the Deed of April 12th, 1843, together with his rights under the license which bore date the day following, and with his interest in the Irish and Belgian patents, in consideration (to speak summarily) of £30,000. The negotiations had arrived at this stage by means of a correspondence between Messrs. Cooke and Wheatstone, from which it appeared that Mr. Cooke was about to transfer both their interests in the patent rights, though he did not think it necessary to communicate to Mr. Wheatstone that the price which he was about to receive for them was £150,000. Mr. Cooke stated, in his evidence before the Privy Council, that Mr. Wheatstone was aware he was selling his patents at a very large sum*. This Mr. Wheatstone

* These proceedings before the Privy Council took place in February 1851, on the occasion of the application of the Telegraph Company for an extension of the term of the first patent. In

denies, for he was kept in the dark as to this important incident of Mr. Cooke's operations; and in fact Mr. Cooke's expressions only disclosed by degrees his actual relations to Mr. Wheatstone; and whereas they represented him at first as merely an agent between Mr. Wheatstone and an unknown company (see his letter of September 15, 1845*), he was subsequently presented as the intended assignee of Mr. Wheatstone's rights under the conveyance (see letter of his Solicitors, 27th of September 1845†), and, eventually, as part purchaser

another portion of his evidence Mr. Cooke says, "I have no doubt Prof. Wheatstone knew to a certain extent, I do not think he did in full, but about the amount I was to receive."

*

"1 Copthall Buildings,
September 15th, 1845.

"MY DEAR SIR,—I have received an order for the Dover line, a circumstance very much in favour of the immediate formation of a Telegraphic Company. As I have not received your answer to a letter written last week, I conclude you are from home, and probably still on the Continent. I will therefore briefly repeat the substance. The arrangements I am making for the sale of the Patents are not sufficiently advanced to admit of their being completed by the 4th October, the day to which you limited me in your letter of (or about) the 4th August.

"Before I commit myself so far, I require your consent to the extension of the period *for which you have given me powers for the sale of your Royalty* in England and Wales, or in part. This period ought to be extended at least to the 15th November, when the commercial world will again be assembled in town, &c.

"Yours truly,

"WILLIAM F. COOKE."

"Prof. Wheatstone."

† "1 Copthall Buildings,
September 27th, 1845.

DEAR SIR,—Herewith we hand you for perusal the draft of an agreement relative to *Mr. Cooke's proposed purchase of your interest*. We understand the terms to be—£20,000 for England,

on his own account (see his letter of the 11th of December 1845*), a position still less compatible with that of agent for Mr. Wheatstone. In this respect, therefore, there was not that explicit dealing on the part of Mr. Cooke which Mr. Wheatstone's relations with him might have led him to anticipate.

To return to the substance of the agreement. If the above terms had been carried into effect as framed, without some additions which it will be most material

£5000 for Scotland, £5000 for Ireland, Scotland and Belgium.. England to be determined on (with or without Scotland) by the 15th November, and Ireland, &c. by January, *if* the English arrangement is fixed by a day [qu. what day?] in October—otherwise to be off. We should be glad to hear from you soon in this matter, as Mr. Cooke expects his friends in town next week.

"Yours faithfully,

"WILSON AND HARRISON."

"*Prof. Wheatstone.*"

*

"1 Copthall Buildings,
December 11, 1845.

"*Cooke and Wheatstone.*

"DEAR SIRs,—There will not, we hope, be any objection to complete the release in this matter at once even in Mr. Richardson's absence. He has, we believe, completely approved of the draft, having given us authority to engross it; and indeed it is a merely formal thing as to which there can be no question. We propose to give Mr. Wheatstone, on his executing the release, Mr. Cooke's promissory note at ten days' for the balance (on the Royalty account), say £1624 11s. 1d. Our object in proposing this arrangement is that the release is part of Mr. Cooke's title, and that his pending arrangements are delayed by the want of it—and the ten days' credit are requested in order to enable Mr. Cooke to put himself in funds by completing his sale *to his new partner*. Requesting the favour of your earliest attention to this matter,

"We remain, dear Sirs,

"Yours very truly,

"WILSON AND HARRISON."

"*Messrs. Richardson and Talbot.*"

to mention, even then the result would have stood thus : —that Mr. Wheatstone would have received a fifth of the price which Mr. Cooke received for their interest in an enterprise in which their shares were originally equal ; in other words, that Mr. Cooke's '*margin*,' of which he spoke with such a happy vagueness before the Privy Council, would have been £90,000. It might astonish the Privy Council, and perplex Mr. Cooke, to account for the grounds of this singular discrepancy. It could not have been, as he stated, that part of the consideration for his £150,000 consisted of his interests independent of the patent rights, as for independent speculations in which he had engaged he received an additional £10,000, as appeared by the evidence of Mr. Barwis the accountant*, and for stores in hand belonging to him a credit of £2564 1s. in the Company's books. He himself admitted on his examination that it appeared from the deed by which the patents were assigned that they were the sole consideration ; and even if he had chosen to blend them with his interests as a contractor, it is immaterial if, as we have shown, the value of his business as such was derived principally from his possession of the patents. It is to no purpose that he further excuses the disproportion by stating that the patents were his *speculative* property. Their value had been fairly tested ; and if he chose to lay down certain lines, partly with his own capital, he did so safely and with the certainty of profit. If he confined himself, on the other hand, to his legitimate business as

* It was £160,000 that he (Mr. Cooke) received credit for in the books of the Company, which seems to have been £10,000 as for work done by Mr. Cooke previously, and £150,000 *was for patent right, as stated in the books.*—*Evidence of Mr. Barwis before the Privy Council.*

a contractor, it was in no sense more speculative than the royalties of Mr. Wheatstone. Both were speculative, in as far as the income arising from either might be indefinitely increased with the increase of operations. But the risk was none if Mr. Cooke confined himself to contracts at definite and remunerative prices, and there was no lack of these, or of a very ample '*margin*,' after payment of all the royalties due to Mr. Wheatstone. There was no *speculation* at all events in the payment to Mr. Wheatstone of a sum which Mr. Cooke had previously received for that purpose from the same parties from whom he received so much larger a payment for himself. To sum up the facts of this part of the case, it appears that if the patents had been sold in April 1843, Mr. Wheatstone and Mr. Cooke must have divided the proceeds. Had Mr. Cooke subsequently sold the patents subject to Mr. Wheatstone's royalties (and he was not empowered to sell them otherwise without making a fresh agreement with Mr. Wheatstone), the latter would have acquired by the end of 1853 upwards of £70,000. If, therefore, instead of anything approaching this sum, he received £30,000, which Mr. Cooke obtained for him from the same parties from whom he himself obtained four times that amount, Mr. Wheatstone apparently had reason to regret a circumstance, stated in his letter to Mr. Cooke of September 17th, 1845, that on account of the ill-health of his solicitor he had been unable to consult him for a year, which included the time during which Mr. Cooke was negotiating the substance of the terms acceded to. For the deprivation of this protection Mr. Wheatstone is of course aware that Mr. Cooke is not answerable, nor does he on this part of the case set up any claim or complaint against him; he relies on this evidence solely to rebut the suggestion that he was treated with unneces-

sary candour, or that he was indebted in any sense to Mr. Cooke's *liberality*.

The circumstances which follow are, however, adduced to sustain such a claim and complaint as is mentioned; and though both have been already stated on page 38, they will become more defined in the process of narration. On October 17th, 1845, Mr. Wheatstone received notice from Mr. Cooke's solicitor that Mr. Cooke would ratify the conditional agreement of October 4th. At this date the royalties and rights of Mr. Wheatstone, under the deed of April 1843, were alone included in the agreement above-mentioned. In December 1845 the necessary deeds of transfer, in pursuance of this agreement, were executed; but in these were included assignments to Mr. Cooke, of past and future patents for England and Wales, to a further extent than was contemplated in the agreement of October. These assignments had, in fact, the following operation. Whereas the payment of Mr. Wheatstone's royalties would have ceased in 1856, the date of the expiration of the sixth English patent (provided it was not renewed), and these royalties were alone included in the agreement of October, all patents already existing which should not have expired in 1856 would have remained the joint property of Messrs. Cooke and Wheatstone, but for these additional assignments of December. By these they became the unconditional property of Mr. Cooke; and, what is of still greater consequence, Mr. Wheatstone was simultaneously bound to communicate and assign to Mr. Cooke all his future improvements on these patents, until the year 1859, the last of which did not expire, without any pecuniary or other consideration*. Of course this engagement must

* By this agreement Mr. Wheatstone was bound to communicate

not be taken to imply that Mr. Wheatstone made Mr. Cooke a supplementary present of all his existing and prospective property in the creations of his skill, but that a consideration for this had already passed, or been assured to him. This consideration, though not described as the equivalent for the rights subsequently transferred by Mr. Wheatstone, had in fact been expressed in a memorandum signed by Messrs. Cooke and Wheatstone, and dated a day previous to their provisional agreement of October 1845. The following is a copy :—

“It is understood that Mr. Wheatstone will take the Chair of a Committee of three, to take charge of the manufacture of the patent Telegraphic instruments, and the taking out and specifying future patents and matters of the like nature, at a salary of £700 a year, and shall devote to such objects what time he shall think necessary. It is also understood that a patent shall be applied for immediately to secure Mr. Wheatstone’s improvements in the mode of transmitting electricity across the water ; that Mr. Wheatstone shall superintend the trial of his plans between Gosport and Portsmouth ; and if these experiments prove successful, then in the practical application of the improvements to the purpose of establishing a telegraph between England and France ; the terms on which such Telegraph is to be held being a matter of arrangement between the proprietors of the

to Mr. Cooke every future improvement he might make or become possessed of, on any of the inventions included in the several patents respectively, during the terms for which they were granted, or during any extension thereof ; provision only being made for repayment of the expenses of obtaining the new letters patent, but none being made for defraying the costs of the experiments. It is true that, as Mr. Cooke states, the same provision existed in the agreement of 1843, but the cases were totally dissimilar ; in the latter Mr. Wheatstone had a direct pecuniary interest in increasing the subsequent value of the inventions, in the other he had none ; and he certainly would have insisted on a clause that he should be compensated for the expense of such experiments, from which he would derive no pecuniary advantage, had he not been convinced that this object was effectually secured by the simultaneous undertaking of Mr. Cooke set forth above.

English and French Patents. *These terms are understood as a part of Mr. Cooke's plans for disposing of the patents to a Company.*

"(Signed)

WILLIAM F. COOKE,
C. WHEATSTONE."

"1 Copthall Buildings, London,
3rd October, 1845."

This memorandum then was the further consideration from Mr. Cooke for the further assignments of Mr. Wheatstone, and as such it was tacitly regarded by the latter. It was subsequently referred to, and its obligations admitted by Mr. Cooke in his correspondence with Mr. Wheatstone. In a letter dated December 13th, 1845, Mr. Cooke says, "I hope we shall get into our new offices and workshops before Christmas. We will then carry out our own manufactory, and call you to our councils." Again, on January 14th, 1846, he writes, "Will you meet me here at four o'clock to-morrow? I wish to introduce you to Mr. Ricardo, who will be here at that time, that we may arrange about your position with us as scientific adviser. Mr. Ricardo has from the first been acquainted with, and approved of, my agreement with you." To this Mr. Wheatstone has now to add, that this agreement was never fulfilled; that he was never appointed Scientific Adviser to the Company; that he has not up to this moment received one sixpence as consideration for the additional rights assigned, or as compensation for the disabilities to which he submitted himself solely in consideration of Mr. Cooke's undertaking.

Mr. Cooke's explanation of the non-fulfilment of his engagement, or rather his implied assertion of its complete fulfilment, is, however, scarcely less extraordinary than the position to which it so unhandsomely consigned Mr. Wheatstone. He states in effect that Mr. Wheatstone

relinquished as his voluntary act, and without compensation, an assured income of £700 a-year, with every means of pursuing his experiments, without expense to himself, because he disapproved of certain connections the Company had formed. So far from this being even in a literal sense true, it is simply impossible that Mr. Wheatstone could have relinquished what he never possessed. He was never recognised in the capacity of the Company's scientific adviser; he never attended any Committee Meeting, or was consulted respecting the taking out of patents by or for the Company; he never received any salary or remuneration in respect of personal services; and, to repeat his statement summarily, his appointment was never resigned, and could not have been resigned, because it was never confirmed, or even offered for his acceptance. If Mr. Cooke's implied and direct statements to the contrary had been true, there would certainly be some entries in the Company's books to corroborate them, and to the production of these Mr. Cooke is invited. (See for a direct contradiction the letters of Mr. Ricardo and Mr. Wheatstone, Appendix B, the statements of the former gentleman being at complete variance with the positive assertions of Mr. Cooke). On the other hand, Mr. Cooke's assertions are in substance, as well as in the letter, a misrepresentation of all that occurred; and if a bold, at the same time a most vain, attempt to shift the responsibility for the breach of his engagement. It appeared that when the Company had formed the new connexions to which Mr. Cooke alludes, there was no longer any disposition to confirm his undertaking. Mr. Cooke himself informed Mr. Wheatstone a short time after that occurrence, that the Directors objected to his appointment

on account of the expense ; nor from that time could he obtain either from Mr. Cooke or from his solicitor any explanation with respect to the fulfilment of the agreement, or of the way in which it was to be interpreted. Mr. Wheatstone, it is true, was invited to take shares in the Company, and thus qualify himself to become a *Director*, which for various reasons he declined ; but he did not, nor was disposed to decline the post of Scientific Adviser, had it been offered to him in pursuance of the agreement.

It is true enough that, as Mr. Cooke avers, “ the memorandum was *for a time acted on* ;” for it was acted on by Mr. Wheatstone on the assumption that it would be confirmed, and, as it proved, at Mr. Wheatstone’s expense. Mr. Wheatstone gave in fact considerable time and attention to the objects therein contemplated ; and afforded all the assistance that was required of him by the Company in the preparation of telegraphic instruments, and in their Parliamentary and legal proceedings. He also made, in accordance with the second paragraph of the said memorandum, an extensive series of experiments on methods of insulating conducting wires for the purpose of crossing the sea ; and he was preparing the specification of a new Patent for the improvements effected, when his efforts were frustrated by the Company themselves, through a proceeding which was in any event unjust to Mr. Wheatstone, but which was *obviously* derogatory and grossly inconsistent with the position which Mr. Cooke assumes to have been accorded to him.

Mr. Cooke’s version of this transaction is, as usual, inaccurate, for he states that Mr. Wheatstone had a controversy with a Mr. Mapple respecting a telegraphic rope, when the relations of Mr. Wheatstone to Mr. Mapple were

simply as follows :—As Mr. Wheatstone was preparing his various plans for the manufacture of the Submarine Telegraphic Line, finding himself in want of a small portion for an immediate experiment, he engaged Mr. Mapple, who was at that time employed by him in the construction of various instruments, to make by hand the requisite quantity. Mr. Wheatstone was about to leave town to superintend some experiments at Portsmouth, when the Company's Engineer expressed a wish to have a quantity of the same material for a special purpose, and as he also was indisposed to wait till the arrangements were completed by which it might be manufactured more perfectly and cheaply, Mr. Wheatstone placed Mr. Mapple at his disposal to execute his orders. On Mr. Wheatstone's return to town he was therefore unprepared to learn that the Company, without consulting him, or giving him the slightest intimation of their intention, had arranged with Mr. Mapple to take out a patent for some supposed improvements which he had made while executing Mr. Wheatstone's orders. When Mr. Wheatstone expressed to Mr. Cooke his surprise at this proceeding, no explanation was offered, and no wish was expressed on the part of the Company, or of Mr. Cooke, that his experiments should be continued. (See note, Appendix D.) From these circumstances, combined with others, it was obvious that there was no intention on the part of the Company to fulfil Mr. Cooke's engagement. All the satisfaction obtained by Mr. Wheatstone was, that the sums expended by him for labour and materials were repaid.

It may be that Mr. Wheatstone has still a legal remedy for the pecuniary loss which in consequence he sustained. But a further injury he incurred, may not be so directly

susceptible of redress. As Mr. Cooke took no steps to obtain the confirmation of his own agreement, Mr. Wheatstone was obliged to desist from proceeding with his operations. The Company ignored the claims of Mr. Wheatstone, whilst the restrictions which accompanied them remained to fetter him. Not only was he deprived of the assistance, in his experiments, which he calculated on obtaining from the Company's co-operation; but he was obliged to make them at his own cost, if he made them at all, to the entire and exclusive advantage of the Company. It is therefore that Mr. Wheatstone may fairly complain that the exercise of any inventive faculties he might possess was effectually prohibited. He was condemned to the alternative of suspending his labours, or of handing over their fruits to others not only without recompense, but at an absolute loss to himself. By the fetters in which he was retained he was precluded from aiding in the development of the invention with which his name is identified; and for some of the best years of his life he was rigorously reduced, with respect to this important object, to a tedious and comparatively sterile inactivity. Mr. Cooke is welcome, if he pleases, to take as he does a trivial view of this predicament. He would not seem pre-eminently qualified to estimate the measure of Mr. Wheatstone's disabilities, if, with the resources of a powerful establishment at his command, with every inducement to proceed, and with no restrictions to deter him, he has not during the same interval, that Mr. Wheatstone is aware of, contributed a single addition to scientific knowledge, or to the apparatus and practical application of the Electric Telegraph. Mr. Wheatstone, on the other hand, may offer proofs hereafter of what he might have done, had

he not been so circumstanced. In the meantime no one in connexion with the Company has shown the slightest interest in developing his various improvements, many of which have never even been made public. In fact, no one has been, or could be benefited by the narrow policy which persists in retaining valuable instruments in their present stage of incompleteness, and which arrests, as far as possible, the progress of invention. Be Mr. Wheatstone's claims to consideration what they may, it should not be lost sight of that the public were entitled to the best services he could render, and that these have been suppressed simultaneously with the injury he has himself sustained by Mr. Cooke's proceedings. Mr. Cooke must, however, meet this and all other responsibilities arising from his arrangements in the best way he may be able: Mr. Wheatstone will not waive his legal claims in this behalf; while at the same time he trusts that, with respect to Mr. Cooke's pamphlet, this narrative of the facts which have been there misrepresented will be deemed as sufficient as he believes it was necessary.

A P P E N D I X.

APPENDIX A.

“ 20 Conduit Street, October 26th, 1840.

“MY DEAR SIR,—Of the paragraphs you refer to I know nothing ; they may be right or they may be wrong, but I have given them no sanction. I am, however, glad that they have afforded me the opportunity of being informed clearly in writing what is your opinion of our present position, for I assure you I have not been able to ascertain it from the conversations which have passed between us. Your statement, though erroneous in many particulars, partly from being influenced by your feelings, and partly from your looking only at one side of the question, is yet written with temper, and I will endeavour to reply to it in the same spirit. I hope that the answers I shall give and the explanations I shall make, will enable us in future to understand each other better.

“ Firstly, you state that ‘ you alone had succeeded in reducing to practical usefulness the Electric Telegraph at the time you sought my assistance.’ Now this I wholly deny ; it is utterly at variance with the facts. Your instrument, however ingenious in its mechanical arrangements, had never been practically applied, and was incapable of being so. On the contrary, the instruments I had proposed were all founded on principles, which I had previously proved by decisive experiments would produce the required effects at great distances.

“ With respect to your statement that I employed myself at your request in perfecting your invention in detail, it is equally erroneous. My time, so far as it was devoted to telegraphic researches, even after I became acquainted with you, was exclusively occupied in perfecting my own instrument, which had

nothing in common with yours, and in which I was not only known to be engaged by all my scientific friends, but which was even announced in public print before I knew of your existence. I confined myself to carrying out one of my own inventions for two reasons ; first, because my experiments led me to believe that the motions of a needle could be produced at distances at which no effects of electro-magnetic attraction could be obtained ; and secondly, I did not wish to interfere with you. With regard to the subsequent development of my first telegraph, the essential principles of which are the formation of numerous circuits from a few wires, and the indication of characters by the convergence of needles, I am indebted to no person whatever ; it is in all its parts entirely and exclusively my own. The modifications which you introduced, without consulting me, in the instruments for the Great Western Railway, I consider as altering the simplicity and elegance of the arrangement, without introducing the slightest advantage, and I certainly should not recognise them in any published description.

“The subject of telegraphic communication has for a long series of years engrossed my thoughts. When I made in 1823 my important discovery, that sounds of all kinds might be transmitted perfectly and powerfully through solid wires, and reproduced in distant places, I thought that I had the most efficient and economical means of establishing a telegraphic (or rather a telephonic) communication between two remote points that could be thought of. My ideas respecting establishing a communication of this kind between London and Edinburgh, you will find in the ‘Journal of the Royal Institution’ for 1828. Experiments on a larger scale, however, showed me that the velocity of sound was not sufficient to overcome the resistances and enable it to be transmitted efficiently through long lengths of wire. I then turned my attention to the employment of electricity as the communicating agent ; the experiments of Ronalds and others had failed to produce any impression on the scientific world ; this want of confidence resulted from the imperfect knowledge we possessed of the velocity and other properties of electricity ; some philosophers made it a few miles per second, others considered it to be infinite ; if the former were true, there would not be much room for hope ; but if the velocity could be

proved to be very great, there would be encouragement to proceed. I undertook the inquiry, and with the result the whole scientific world is acquainted. At the same time I ascertained that magnetic needles might be deflected, water decomposed, induction sparks produced, &c., through greater lengths of wire than had yet been experimented upon. In the following year, at the request of the Royal Society, I repeated these experiments with several miles of insulated wire, and the results were witnessed by the most eminent philosophers of Europe and America. I ascertained experimentally (which had never been done before) many of the conditions necessary for the production of the various magnetic, mechanical, and chemical effects in very long circuits; and I devised a variety of instruments by which telegraphic communication should be realized on these principles.

“The real particulars of the circumstances under which your name was allowed to take the lead in the British patents have escaped your memory: I will endeavour to recall them to you. When you first proposed a partnership, you know how strongly I opposed it, and on what grounds I did so. I said that I felt myself perfectly confident of being able to carry out my views to the ends I anticipated; that I fully intended to do so, to publish the results, and then to allow any person to carry them into practical effect. I told you, that while I admired the ingenuity of your contrivance, I had no opinion whatever of its applicability to the purpose proposed; and I urged that, in the position in which I stood, to associate my name with that of any other person, would diminish the credit which I should obtain by publishing separately the results of my researches. To this you replied, that you were not seeking scientific reputation, that no difference could arise between us on this account, and that your sole object was to carry the project into execution, so that it should produce a profitable result. These and other matters having been concluded, it was finally arranged that a patent should be taken out in our joint names, which should include our two separate instruments. When we met to settle the preliminaries of the English patent, I was much surprised with the claim you put forward to have your name inserted first. I considered that, as we put ourselves on an equality, by contributing each an invention, to allow my name, which was well known, to follow yours, which was then totally unknown,

might be construed into my admitting that your share was greatly superior to mine. You urged that your pecuniary obligations were greater than mine; that as I intended to leave all negotiations with you, your authority would be less respected if your name appeared second, and that your invention was more valuable than mine (an assumption which I did not admit, as I considered, what the result confirmed, mine to hold out the greatest promise of success). After some discussion, it was finally agreed that my name and yours should stand alternately first in all succeeding patents. Some time after this we met to arrange the preliminaries of the Scotch patent; you had already prepared the declaration. On reading it over I was surprised, after what had passed, to find that your name was placed first; I objected to this as contrary to our previous understanding. You said it had been done without your knowledge, but you objected to having it altered, on account of the delay it would occasion. After some discussion we came to a new arrangement; on my allowing that your name should stand first in the British patents, mine was to take the lead in all foreign patents that might be taken out. I did not expect that a similar circumstance would re-occur; but when it was resolved that an American patent should be obtained, and I attended to sign the preliminary papers, again I found that, without any previous notice having been given me, my name was made to follow yours. I felt that this was not only unjust, but a distinct breach of agreement. I used no importunities as you state; but, standing on these grounds, I refused to sign the papers: you then consented to keep your word. The only reason you alleged on this occasion was, that your authority as manager would be diminished if you appeared as second partner.

“Your assertion, therefore, that I yielded to your superior claims at Mr. Lane’s in 1837, is totally without foundation. From your making it now, it might appear that, when, contrary to previous understandings, you endeavoured by persuasion and other means to have your name placed the first in all documents, it was with the intention that you might afterwards represent that I allowed your share in the inventions to be the most important. You cannot bring forward one word I have ever spoken, or one line I have written, in which I have admitted

this claim ; and you know well that it was only as co-proprietor and managing partner that I have consented your name should stand first in legal documents.

“ I have ever ascribed the commencement of our misunderstanding to the omission of your instrument from the first patent ; had it remained as at first intended, we should have appeared to stand on terms of equality there, and no difference would probably have arisen between us ; but that having been given up as hopeless and omitted, you thought it necessary to put forth claims to a greater share of the remainder than I could admit.

“ All that I have hitherto said refers to our mutual position previous to my communicating to you those results which led to our obtaining a new patent. Up to a certain time I was in the constant habit of communicating to you without reserve every suggestion as it came into my mind, partly because I thought you would take pleasure in everything that might advance our object, and partly because I had no control over the funds furnished you by the companies for carrying our experiments into effect ; and you alone on that account were enabled, if the suggestions were approved of, to put them into practice. It was not long, however, before I observed with regret, that when I proposed any improvement or obviated any existing difficulty, that you seemed to feel more jealous that I should be the first to suggest, than satisfaction at the result ; and frequently, at the same time you were receiving with coolness my plans, you set yourself thinking how the same thing might be effected, not in a better, but in a different manner. This naturally hurt me, and led me to resolve to interfere with you as little as possible, to carry on my future investigations alone, and to inform you only of the final results when obtained. After this resolution had been taken, I commenced a series of researches on the laws of electro-magnets, and was fortunate enough to discover the conditions, which had not hitherto been the subject of inquiry, by which effects could be obtained at great distances. This rendered electro-magnetic attraction for the first time applicable in an immediate manner to telegraphic purposes, and I then proceeded to inquire how the principles I had ascertained could be best practically applied. The result was a variety of new

instruments and apparatus, in which, with many entirely new points, I embodied everything I thought valuable which the discoveries of others enabled me to do ; some of these, involving the main principles, are described in our patent, while others were, with your consent, withheld. All my new instruments, however, did not depend on electro-magnetic attraction, for in some, quite different principles were involved.

“ When I had attained some complete and decisive results, I invited you to the College to see them. Before I described to you my new experiments and showed you my new instruments, I proposed conditions to the following effect :—That having at my own expense undertaken a series of investigations which led to important consequences greatly increasing the pecuniary value of the patents, and having invented new instruments, which, besides being applicable to all the purposes for which the existing arrangements could be applied, might also be profitably applied to other purposes to which the previous instruments were not at all adapted, I required as a compensation for this valuable addition to the common stock, and to enable me to proceed with the experiments, that I should retain the exclusive right of manufacturing them and all instruments I should construct involving the same principles, and also the privilege of employing them exclusively for domestic and official purposes. To these conditions, with others of less importance, you assented ; and after I had showed you the instruments which were completed, and read you a list of the further experiments I had in progress, you confirmed in the most unreserved manner this assent. On this occasion you breathed not a word respecting the claim you have since put forward, to be considered the joint inventor of my new instruments. This claim of yours I will now take into consideration. You ask me to acknowledge ‘that I, having in progress certain improvements on our joint invention, depending fundamentally upon principles first discovered and applied by you, and since worked out separately by each of us in forms essentially distinct, had asked you as a favour,’ &c. It is unjust to urge such an acknowledgement upon me, and I state plainly that nothing shall compel me to make it. My instruments are as original combinations as were ever put together, and involve a great number of points entirely new. With equal

justice might Mr. Ronalds call upon me to declare that he is the joint inventor, because, like him, I have employed a revolving dial with letters ; or Professor Steinheil complain of my suppressing his name, because in one of my most important modifications I employ, as he has done, the magneto-electric machine,—as you to put forth that claim, because in some of my new instruments I have employed electro-magnetic attraction, which you had done two or three years before me in your instrument ;—or with the same show of reason might Mr. Morse call upon me to proclaim him to be the joint inventor, because he, independently of you, had employed an electro-magnet to move machinery intended for a telegraph. I am sure I shall be considered as dealing to all parties the full measure of justice, when I acknowledge, as I shall be always ready to do, that Ronalds', yours, Morse's, and Steinheil's instruments have all preceded my last inventions.

“ You also ask me to admit, that the instrument represented in the fourth sheet of the drawings of the new patent is essentially distinct from mine, and was worked out by you separately. I cannot make this admission. The instrument in question was devised by you after my new instruments, and with a full knowledge of all I had done. It involves, as you have acknowledged, a number of things which I was the first to propose. It is not massive like your first instrument, but delicate like mine ; it requires my improvements in the electro-magnets ; you have made it, like mine, independent of chronometric arrangement ; you employ, as in one of the instruments I proposed, a double magnet with three wires ; my principle of relay-circuits is indispensable to its action ; and you employ adhesion instead of attraction, as in the first alarm I proposed before I was acquainted with anything you had done. I put in no claim to be called the joint-inventor of your new combination ; I only state that my instruments, in which the above principles were embodied, were previously invented by me.

“ You allude to a conversation which we had in July last in Lincoln's Inn, in which you say I admitted the justice and moderation of your claims. On that occasion you put forth none of those assertions to which I now so strongly object ; and my impression during the conversation was, that I had hitherto

mistaken your feelings, and that there was little, if any, difference in the views we took of each others position. I had hoped, from what then passed, that the distance between us was about to be removed, but I made no admissions regarding any of the points at issue.

"I hope I misunderstand you in that part of your letter which seems to me to hold out a threat, that unless I make an acknowledgement which is untrue, you will withhold your assent to the agreement which is pending between us. Perhaps legally it is in your power to do so; but I can only say, that as, in such case, I could no longer have that dependence on your word or confidence in your honour which I now have, I should break off personal communication with you, and let all matters in future be arranged between our solicitors; and, further, I should not sign a single paper referring to the subject, if your promise to complete this agreement were not redeemed.

"When I entered into a commercial speculation with you I had no intention to give up my right to call my own discoveries and inventions my own, and I thought we had understood each other distinctly on this head, or I would never have connected myself with you. With respect to my own experiments connected with the telegraph, they are so separate from yours, and so intimately mixed up with other theoretical researches and practical consequences in which you have no interest, that I could not, if I would, associate your name with them, particularly since you are unacquainted with the principles on which they are founded. The experiments which I have been accustomed to show at the College have been entirely my own, and you have no right to complain that I did not go out of my way on every occasion to advertise your name to every person who visited me. I do not blame you for describing to your visitors your operations on the railway in the first person singular—you have an undoubted right to do so. When I have occasion to speak of the lines you are laying down, or of anything you have done, I always mention your name with the praise it deserves.

"Your name has been frequently before the public: paragraphs have appeared in the public papers ascribing to you the chief, and in some cases the sole merit. You have placed your name prominently first on all the instruments at the railway, so as to

produce the impression that you are the principal inventor ; and you have allowed your friends to represent that you are the original inventor, my share being merely that of advising you to carry out the details. Surely I have more reason to feel aggrieved than you have.

“ One of your complaints is, that in the notices of my experiments in Belgium, the employment of two wires for an electric telegraph was not specifically mentioned as a discovery of yours. Such a claim on your part has no foundation ; for without going further back, Ronalds’s telegraphs, two telegraphs on different principles which I myself proposed before I knew you, and Steinheil’s telegraph, with which I was acquainted before yours, all required only two wires. I have never stated the employment of two wires to be an original idea of my own, but only that my instruments belong to a class in which that condition is fulfilled. Immediately after our acquaintance, I showed you a list of all the projects I was aware of, together with my own, in which they were divided into two classes, according as two or several wires were employed in their construction.

“ You forget that all you have put forward at the conclusion of your letter as the ‘ broad basis of your claim,’ is equally applicable to me. Your words are, ‘ that alone, unaided and un-
‘ advised, you projected, and after five years of indefatigable
‘ perseverance amid the greatest difficulties, have now intro-
‘ duced into daily use your own project of a practical electric
‘ telegraph, which in theory had remained for many years a
‘ plaything in the hands of scientific men, and might, but for
‘ your exclusive devotion to it from the first day the idea oc-
‘ curred to you, have remained so till this day.’ You forget that I alone, unaided, before I was acquainted with you, had carried into effect, at a very considerable expense, compared with my then limited means, the extensive experiments on which all my subsequent researches have been founded. You forget that I have for the last three years worked indefatigably day and night in endeavouring to remove the remaining difficulties, and to make further improvements, when I might have turned myself to objects which would have brought me reputation and profit. You forget that it is *my* electric telegraph and not *yours* that is in daily use. And, lastly, you forget that had it not

been for my almost exclusive attention to it since I first conceived the idea, a practical electric telegraph might have still remained an unaccomplished purpose.

“Do not, however, misunderstand me. Far be it from me to underrate your exertions ; they have been very great, and absolutely indispensable to the success of our joint undertaking. Without your zeal and perseverance and practical skill, what has been done would not have been so readily effected ; but, on the other hand, I may say, that had you entered the field without me, your zeal, your perseverance and your money would have been thrown away. I am perfectly willing, that considering our joint exertions as tending in different ways to the practical realization of the Electric Telegraph, as a profitable and publicly useful enterprise, that we should be regarded and mentioned as on equal terms ; and if I can do anything by which your position in this point of view would be better acknowledged, I will readily do it. But in making this concession I would by no means be understood to forego my indisputable right to call my own researches, discoveries and inventions, my own, and of publishing them when and in what manner I think proper. You, on your part, will exercise a similar right with regard to your inventions and contrivances. In addition, whilst I claim what merit there may be in working out the laws of electric circuits which have relation to telegraphic communication in the manner I have done, and which will shortly be published, to you will be due the whole merit of laying down the lines and of overcoming all the practical difficulties attending that important operation.

“In conclusion allow me to say, that notwithstanding the unpleasant differences which have arisen between us, and which I attribute more to erroneous impressions on your part than to any intention to act unjustly towards me, I still unhesitatingly confide my pecuniary interests in your hands, assured that I shall have no cause to regret the trust I have ever reposed in you. It would give me the highest pleasure if the present causes of misunderstanding removed, we could meet again on those terms, when with mutual hopes and undistracted by petty jealousies, we looked forward in our first beginnings to the end which seems now nearly attained.

"The view of our relative position, which I have given above, I am sure you will, on cool reflection, see to be a just one. It is the only one which, unreservedly admitted on both sides, can prevent future disputes and restore our former unanimity.

"I remain,

"Yours very faithfully,

(Signed)

"C. WHEATSTONE."

"W. F. Cooke, Esq.,
Coptall Buildings."

APPENDIX B.

Correspondence between Prof. Wheatstone and J. L. Ricardo, Esq., M.P., Chairman of the Electric Telegraph Company.

No. 1.

"Lower Mall, Hammersmith,
February 8th, 1855.

"DEAR SIR,—In a pamphlet recently published by Mr. Cooke, certain statements have been made with reference to my relations to the Company of which you are the Chairman, and for the correct representation of which I conceive I am honourably entitled to refer to yourself. I will thank you, therefore, to direct your Secretary to inform me whether you are aware of any confirmation of my appointment as 'Scientific Adviser' to the Electric Telegraph Company in conformity with the terms of the enclosed memorandum; whether I was ever recognized, or attended any Committee meeting in that capacity; whether I was ever consulted respecting any of the Patents taken out by or for the Company; whether I ever resigned the appointment in question, and whether any salary, or sum in respect of my personal expenses, was ever paid to me. If I am not furnished with a direct negative to these questions, may I ask for the dates

of my supposed appointment and resignation, as such circumstances, if they ever occurred, must be recorded in the Company's books.

"I remain,

"Yours faithfully,

"*J. L. Ricardo, Esq., M.P.*"

"C. WHEATSTONE."

No. 2.

"London, February 13, 1855.

"DEAR SIR,—I have looked back to such papers as I could find in the Office of the Electric Telegraph Company, in order to enable me to answer the questions put to me in your letter of the 8th of this month.

"So far as I can recollect, it was stipulated by the Company with Mr. Cooke that they should have the advantages of your services at a salary of £700 a year, should they require them, but it was no part of the agreement that they should be bound to accept them whether they required them or not. The point, however, was not raised, for the Company found themselves involved in a difficulty before the Committee of the House of Lords on their bill, arising from a dispute between Mr. Bain and yourself.

"In order to obtain their act of incorporation, they found themselves compelled to come to a compromise with Mr. Bain, by which he became identified with the Company and was subsequently elected a Director*.

"On this arrangement being made, you declined further connexion with the Company, and therefore the question of your appointment never came before the Board, and I have looked over the Minutes without finding any allusion to it.

"In the meantime you had conducted some experiments at the Strand and at Portsmouth, and I have before me a receipt dated 22nd February, 1847, for expenses incurred, in which you allude to a bill delivered which I think was never sent to the

* The connexion of the Company with Mr. Bain was not of long duration; and when this impediment was removed, Mr. Cooke took no steps to fulfil his engagement, though urged to do so by Mr. Wheatstone.

Company, as the only bill I can find is one for the manufacture of certain instruments receipted and dated 23rd July, 1846.

"I am, dear Sir,

"Faithfully yours,

"*Professor Wheatstone.*"

"J. LEWIS RICARDO."

No. 3.

"Lower Mall, Hammersmith,
February 21, 1855.

"DEAR SIR,—I have received your letter in answer to mine of the 8th instant, and it is to a certain extent what I expected it would have been. There is, however, a point on which you have been misinformed, viz. that on the arrangement being made with Mr. Bain, I declined further connexion with the Company; I wish to know on what authority this statement rests, for neither verbally nor by writing did I ever make any communication to the Company or to any of its officers to this effect.

"I never refused to accept the position of 'Scientific Adviser' in conformity to the terms of the memorandum to which I referred you, and of which I enclosed a copy.

"My connexion remained, for some time after the arrangements referred to, on the same footing as before, that is, I continued always ready to give any assistance required of me, and I was on several subsequent occasions asked to do so. My connexion in this way did not cease until the beginning of 1850, though my appointment as Scientific Adviser was never confirmed.

"The reason you can find no bill of mine respecting the expenses of the Submarine Telegraph experiments, is that none ever was sent. What I furnished the Secretary with were copies of the bills of Messrs. Walker (for lead), Mr. Mapple, Mr. Darker and Mr. Lachnal, which I had previously paid. I made no charge whatever for my expenses.

"I remain, dear Sir,

"Yours faithfully,

"J. L. Ricardo, Esq., M.P."

"C. WHEATSTONE."

(To this letter no answer was returned.)

APPENDIX C.

*Extracts from Mr. Cooke's evidence before the Privy Council,
February 12th, 1851.*

1.

"Professor Wheatstone was the safe proprietor of his share; his amount was a royalty, and when I came to sell to the Company, I asked him what sum he wished for his share; he was aware of all the work I had done, and the works in progress; he entered into a calculation and took £30,000, the amount which he asked. I gave it to him in full. I never bargained nor anything of the kind.

2.

"Q. You will explain, I am sure, how it was that when these Patents were not the sole consideration for the money, the assignments were so drawn up as to make it appear that the Patents were the sole consideration.

"A. There, if any man, my lawyer was to blame. I never read them through. I was assured that all was right, and it was approved by Counsel in the usual way, and of course I put my signature.

"Sir F. Thesiger.—And it has been acted upon.

3.

"Sir F. Thesiger.—I believe that the invention originated with you, and you called in the science and skill of Professor Wheatstone to assist you?

"A. I had been engaged about a year and a half before I had the pleasure of knowing Professor Wheatstone, but he, as a scientific man, had been very deep in most valuable parts before I knew him, and he had enlightened the world on most important parts.

APPENDIX D.

Note on the Submarine Telegraph.

A submarine electric telegraph was, from the commencement of Mr. Wheatstone's experiments, a prominent object in his thoughts. He has several letters, dated in the spring of 1837, from gentlemen acquainted with his plans, referring to this project. The first occasion on which any allusion to this subject appears in print is in the Fifth Railway Report of the Select Committee of the House of Commons. Mr. Wheatstone was examined before this Committee on February 6th, 1840; and Sir J. Guest, who was previously acquainted with his plans, put the question, "Have you tried to pass the line through water?" to which he replied, "There would be no difficulty in doing so, but the experiment has not yet been made." The Chairman (Lord Seymour) then asked, "Could you communicate from Dover to Calais in that way?" His answer was, "I think it perfectly practicable." Shortly after this, having been furnished with the necessary hydrographic information by his friend Sir Francis Beaufort, and received much useful counsel from the late Captain Drew of the Trinity Board, Captain Washington, and other scientific naval friends, he prepared his detailed plans, which were exhibited and explained to a great number of visitors at King's College, among whom were the most eminent scientific men and public authorities. He also made the subject known in Brussels. In a notice of his new telegraphic instruments, by Prof. Quetelet, published in the 'Bulletin of the Academie Royale de Bruxelles' for October 7th, 1840, it is stated,—“On sera sans doute charmé d'apprendre que l'auteur a trouvé le moyen de transmettre les signaux entre l'Angleterre et la Belgique, malgré l'obstacle de la mer. Son voyage se rattachait en partie à cette importante opération, qui mettrait l'Angleterre en rapport immédiat avec notre pays, la France, la Hollande, l'Allemagne, et même la Russie.” And in 'Le Fanal,' a Brussels paper of September 30th, 1840, it is observed,—“M. Wheatstone pense qu'il est possible de communiquer avec son appareil entre Douvres et Calais; il répète en ce

moment ses expériences à l'Observatoire de Bruxelles, en présence de plusieurs savans litterateurs."

Mr. Wheatstone's plans were also shown in 1841 to some of the most distinguished scientific men in Paris, who came to see his experiments at the College de France.

In the agreement entered into by Mr. Cooke and himself in April 1843, it was stipulated that certain limitations therein expressed "should not extend to prevent the said Charles Wheatstone from establishing electric telegraph communication between the coasts of England and France, which he is hereby expressly authorized to do if he shall so please, and for his own exclusive profit."

The agreement made with Mr. Cooke in October 1845, by which he undertook that the Company to whom he was about to sell the Patents should assist Mr. Wheatstone in carrying his project into effect, is given at length in the text, p. 51.

The Abbé Moigno was in England in the spring of 1846, whilst Mr. Wheatstone's experiments were in preparation, and he published an account of what he had seen in 'L'Epoque' of October in that year. This notice he afterwards reproduced in the first edition of his 'Traité de Télégraphie Electrique' (Paris, 1849). It is as follows:—

"M. Quételet avait annoncé, dès 1840, que M. Wheatstone avait trouvé le moyen de transmettre les signaux entre l'Angleterre et la France, malgré l'obstacle de la mer. J'ai vu de mes yeux, j'ai touché de mes mains le conducteur qui, en se reposant au fond des mers, unira étroitement les côtes d'Angleterre aux côtes de France. Ce conducteur est parfait, il remplira pleinement son but; tout homme sérieux qui l'aura vu et touché comme moi ne pourra pas même conserver l'ombre d'un doute sur un succès devenu palpable. Avant deux mois, des machines puissantes l'auraient produit dans toute sa longueur, mais partagé en section de deux kilomètres et demi. Huit jours suffiraient aux officiers de marine, qui s'y sont préparé par une étude approfondie, pour le mettre en place, et après quelques semaines Paris et Londres se toucheraient; il n'y aurait plus ni abîme, ni distance, le génie de l'homme aurait tout vaincu."

In consequence of Mr. Cooke's non-fulfilment of his engagement, and the proceedings on the part of the Company referred

to in the pamphlet, Mr. Wheatstone was obliged to relinquish an object which had been a cherished one with him for many years. The Company, instead of giving him the assistance he relied upon, placed obstacles in his way, and his previous arrangements with Mr. Cooke precluded him from attempting to accomplish it through other channels. The result was that, for a time, the subject was in abeyance; but five years afterwards it was taken up from Mr. Wheatstone's starting-point, and was successfully accomplished by the enterprise and skill of other parties, unconnected either with the Company or with himself.

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A reply to Mr. Cooke's pamphlet, "T
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